35th Year MAY, 1951

# RUBBER AGE

**SAFE and FAST ACCELERATORS**

**BISMATE or LEDATE**

*for rubber*

**CUMATE**

*for GR-S*

SEE THE NEWS FOR CLUES!

*the March-April edition covers the subject*

**R. T. VANDERBILT CO. INC.**

230 Park Avenue, New York 17, N. Y.

# There's a DU PONT AQUAREX for any requirement . . .

Mold lubricant—wetting agent—latex stabilizer

**AQUAREX ME**—A dry powder with minimum electrolyte content. Dilute solutions of Aquarex ME provide highly efficient mold release with little lubricant build-up. It is an excellent stabilizer and wetting agent for latex compounds. Aquarex ME increases the penetrating power of impregnating compositions and increases fluidity of dispersions, slurries or pastes of insoluble dry powders.

**AQUAREX MDL PASTE**—Where an aqueous paste is preferred, Aquarex MDL can be used to replace Aquarex ME. Although Aquarex MDL has a slightly higher electrolyte content than Aquarex ME, their properties are very similar.

**AQUAREX D**—Where a higher electrolyte content can be tolerated, Aquarex D can be used to advantage in latex compounding. The active ingredient for Aquarex D is the same as Aquarex ME, and it is an excellent mold release agent. However, lubricant build-up is slightly more rapid because of the higher electrolyte content.

**AQUAREX L PASTE**—Specifically developed as a corrosion-inhibiting mold lubricant. Tests show Aquarex L Paste does not contribute to corrosion of steel. In fact, tests indicate it even protects steel from corrosion by dilute mineral acids. Because it is so effective for mold release, solutions of low concentrations are practical.

**AQUAREX NS**—An amphoteric stabilizer for use in most types of neoprene latex compounds. Can be used in low pH compounds for dipping, gelation molding or adhesives, since it is effective even in acid systems. Useful in spreading or combining compositions because it is an excellent stabilizer with lower wetting power than Aquarex D.

**Complete information on Du Pont Aquarexes will be found in Bulletin 51-2. Extra copies are available. Write: E. I. du Pont de Nemours & Co., or the nearest district office.**

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## DU PONT RUBBER CHEMICALS

E. I. du Pont de Nemours & Co. (Inc.), Wilmington 98, Del.

DU PONT

BETTER THINGS FOR BETTER LIVING . . . THROUGH CHEMISTRY


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***Another new development using***

**B. F. Goodrich Chemical Company** ***raw materials***

*Hycar seal developed and made by Parker, Stearns & Co., Brooklyn, N. Y.*
*Photo courtesy of Republic Aviation Corp., Farmingdale, Long Island, N. Y.*

# safest seal

## FOR A THUNDERJET

THAT'S the greenhouse of a Thunderjet, ready to slip into position. When it does it will stay sealed air-tight, even at supersonic speeds and high pressures.

You wouldn't know that the manufacturer had tried dozens of seals—all failures until Hycar was used for the job. These inflatable seals of various materials would crease and fold in the corners or pull out of the channel. Some became soft under high temperatures. Some "ballooned" into the cockpit.

All that happened before a Hycar OR-25 compound was used. The seal is a U-shaped tube with a short intake tube connected to the Thunderjet's compression pumps for fast inflation to lock the seal. The tensile strength of Hycar, its low compression set, its resistance to low and high temperatures, its oil resistance and aging make it the ideal rubber compound for the purpose.

Hycar OR-25 is just one of a wide range of highly useful rubber compounds. They've helped solve many "tough" problems, because they are so versatile. For Hycar has advantages that exactly meet many civilian *and* defense needs.

Hycar has outstanding resistance to oil, gas and many chemicals. It resists heat and cold, weather and wear, abrasion and more hard-to-meet conditions. It may be just what you need to improve or develop a product. Right now demand for Hycar exceeds supply. But we can supply experimental quantities for development work. For helpful information and technical service, please write Dept. HA-3, B. F. Goodrich Chemical Company, Rose Bldg., Cleveland 15, Ohio. In Canada: Kitchener, Ontario. Cable address: Goodchemco.

**B. F. Goodrich Chemical Company**
**A Division of The B. F. Goodrich Company**

**Hycar**
Reg. U.S. Pat. Off.
*American Rubber*

**GEON polyvinyl materials • HYCAR American rubber • GOOD-RITE chemicals and plasticizers • HARMON organic colors**

## *Cuts and cracks will seldom grow*
## *In tires processed with* **Philblack* O!**

"Foiled again!" says Old Man Tire Trouble. "There's just no slashing miles off treads made with Philblack O."

Time after time Philblack O has demonstrated its great talent for dulling the attacks of cuts, bruises and chips on tire life. Combined with cold rubber, this HAF (High Abrasion Furnace) black achieves phenomenal tire endurance. Minimum crack growth!

Bulk or bagged Philblack O is shipped from Borger, Texas. Lcl and ltl bagged shipments are also available from Borger and from Philblack warehouses in Akron, Boston, Chicago, Trenton, Los Angeles, Montreal and Toronto.

**PHILLIPS CHEMICAL COMPANY**

*PHILBLACK SALES DIVISION*

EVANS BUILDING · AKRON 8, OHIO

Phillips 66

Philblack A and Philblack O are manufactured at Borger, Texas.
Warehouses in Akron, Boston, Chicago and Trenton. West Coast agent: Harwick Standard Chemical Company, Los Angeles. Canadian agent: H. L. Blachford, Ltd., Montreal and Toronto.

* A Trademark

# rubber compounders prefer PLIOLITE S-6B

# 6 to 1

After direct comparison with competitive resins, rubber compounders throughout the industry report they prefer PLIOLITE S-6B—*by nearly six to one!* Specific characteristics of this use-proved Goodyear rubber reinforcing resin mentioned in the survey were:

*EASIER PROCESSABILITY*
*MORE THOROUGH COMPATIBILITY*
*EXCELLENT PHYSICAL PROPERTIES*

PLIOLITE S-6B is already in use in shoe soles, wire insulation, flooring, rubber hose and tubing and a wide range of molded and inflated rubber items. But these are only a few of the potential uses of this leader in the field of copolymers for reinforcing rubber.

Write today for full details, and samples for your own evaluation, to:

**Goodyear, Chemical Division, Akron 16, Ohio**

USE PROVED *Products*

GOODYEAR

*We think you'll like "THE GREATEST STORY EVER TOLD"—Every Sunday—ABC Network*

Pliolite—T. M. The Goodyear Tire & Rubber Company, Akron, Ohio

# RUBBER & PLASTICS MACHINERY BULLETIN

**Reporting News and Machine Design Developments**

IN BUSINESS TO **NRM** REDUCE YOUR COSTS

## MANPOWER SAVED WITH AUTOMATIC BIAS CUTTER CONTROLS

### No operator needed in band-building set-ups for different ply widths

With the use of NRM's fully automatic bias cutter controls, no operator is needed in band-building set-ups, which require cutting one width for a period of time, then changing to another width for a similar period.

Manual operation can be used where desired for abnormal conditions, and service personnel can check the cutter occasionally. However, the cutter will operate as long as the cut stock is being removed from the bias cutter table. An auxiliary device accurately positions the stock in line with the splicing take-off for maximum splicing efficiency.

Ply widths are gaged and controlled directly by two photo-electric cells, mounted on the cutter bar. The width being cut is indicated on a large, easily read scale. Handwheel adjustment of ply width can be made from either side of the cutter.

A control station mounted on the side of the cutter provides for complete control of all electrical equipment: cutter motor, and let-off motor. A main control panel houses the control elements.

The table is driven by a special motor. The handwheel normally used for final determination of width is equipped with a clutch to permit disengaging the handwheel for automatic operation.

**CUTTING SPEEDS**

| Range of ply widths | Max. cuts per minute |
|---|---|
| 10" to 24" | 20 |
| 24" to 36" | 18 |
| 36" to 48" | 15 |

**At above speeds, accuracy can be maintained within 1/32" on each cut.**

Your present cutters can be converted for fully automatic operation by the addition of NRM's electronic equipment, a knurled table drive roll with integral drive sprockets, a self-leveling high festoon, and separating rolls to open a space between plies for photocell operation.

Angles from 45° to 90°, and ply widths from 10" to 48" are permitted with the standard arrangement. Greater widths can be accommodated with less angle adjustment.

## Strainer down time reduced; production boosted

QUICK OPENING HINGED PLATE STRAINER HEAD

Two recent improvements in NRM strainers further increase the efficiency and ease of handling this equipment.

All NRM strainers, 6" through 12", are now equipped with a hinged strainer plate. The plate can be opened and closed quickly, thus reducing down time for cleaning.

NRM's newly developed conical nose screw permits straining up to 30% more natural or synthetic stock. Also, the customary bulk of contaminated stock, which ordinarily must be cut off when changing screens, is eliminated.

The new conical nose screw can be incorporated into your present strainers if they are of the conical head type.

## NRM Extruders reduce maintenance problems

NRM HEAVY DUTY TUBING MACHINE

Rugged construction and sound engineering characterize NRM Extruders. From die to mill tee, each part of NRM Extruders has been carefully engineered to give maximum service. Large feed hoppers with an undercut beneath the screw give maximum stuffing with either strip or hand feed.

Screws are milled from solid forgings, heat treated, and flights hard surfaced. A long shank, extending through the quill on which the herringbone bull gear is mounted, gives firm solid support, yet permits screw removal in minutes. A large roller thrust bearing transmits thrust to the heavy cast-iron gear housing.

Three stages of herringbone gears transmit power from an integrally mounted drive motor to the screw. All gear shafts are mounted in heavy duty roller bearings on fixed centers. Gear ratios from 11.5:1 to 70.2:1 can be used interchangeably in the same gear housing. Bearings are lubricated by simple mechanical oil collectors.

Carefully designed circulating chambers give efficient cooling in the screw area with water and steam metered in through an integral valve block. Drain piping is equipped with valves for flow control.

**NATIONAL RUBBER MACHINERY CO.**

General Offices & Engineering Laboratories
Akron 8, Ohio

PLANTS at Akron and Columbiana, Ohio and Clifton, N. J.
AGENTS East: National Rubber Machinery Co., Clifton, N. J.
West: S. M. Kipp, Box 441, Pasadena 18, Calif.
EUROPE Rubber Machinery: GILLESPIE & COMPANY
96 Wall Street, New York 5, N. Y.

*Creative Engineering*

# Let Naugatuck Give Your Products A Lift

We've done it for hundreds of products. If your product can use coatings, dippings, bondings, saturatings, it can benefit in many ways from the wonders that can be worked by Naugatuck's Latices, Lotols® and Dispersites®. If you are looking for new product ideas, get in touch with Naugatuck.

Naugatuck Chemical Division of UNITED STATES RUBBER COMPANY

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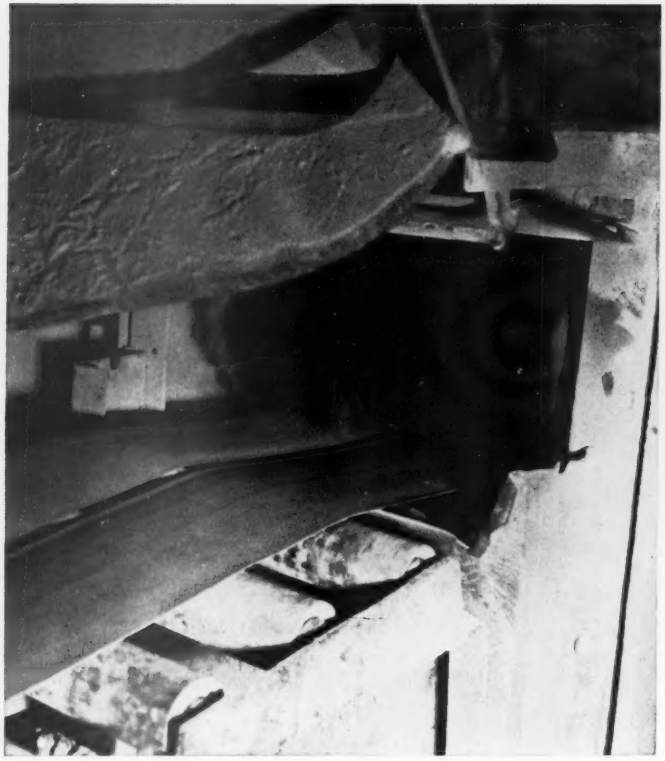


*In the operation above, soapstone talc is being blown on each side of uncured rubber stock as it is leaving the extruding machines. The Osborn brushes (shown at the left of this photograph) are spreading the talc evenly and removing the excess powder which is salvaged for later use.*

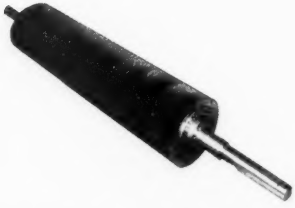
*Brushes formerly used had wooden cores and were subject to splitting and warping. The present Osborn Helimaster® brushes have steel center construction to provide greater uniformity of fill, with just the right stiffness and fullness for efficient spreading action and longer-operating life.*

# What spreads the talc . . . uniformly?

*. . . a brush!* Shown above are Osborn power brushes applying soapstone talc to the "tacky" surface of uncured tire stock as it leaves the extrusion machines.

Formerly the talc was blown onto each side, but coverage was spotty and talc was wasted. Now the uniform, thin layer of talc powdered over the entire surface permits easy stacking and handling without sticking.

There are unlimited uses to which Osborn power brushing can be put to improve your operations, save man-hours and cut costs. Your **O**sborn **B**rushing **A**nalyst will gladly demonstrate how. Simply request an **OBA.** *Write The Osborn Manufacturing Company, Dept. 454, 5401 Hamilton Avenue, Cleveland 14, Ohio.*



*Osborn Helimaster brushes are furnished in a wide range of diameters, lengths and types of fill material to suit every kind of industrial cleaning, scrubbing or surface finishing requirement. For present or proposed needs your* **OBA** *(***O***sborn* **B***rushing* **A***nalyst) will gladly show you how new Osborn brushing techniques can improve your operating efficiency and cut production costs. Call or write for this service. There is no obligation.*

OSBORN

**LOOK FOR THE NAME OSBORN . . . RECOGNIZED EVERYWHERE FOR QUALITY WORKMANSHIP AND MATERIALS**

**EXACT REPRODUCTIONS**—*in color, size and appearance—these fishing lures are protected against color change by* WING-STAY S. *Low water extractibility of this antioxidant also led to its selection over other antioxidants.*

# for best color retention and antioxidant protection

## use *Wing-Stay S*

WHEREVER you want an ideal combination of antioxidant protection with non-staining properties and excellent color retention — in either natural or synthetic rubber compounds — try Goodyear's use-proved WING-STAY S.

This low-cost antioxidant has been widely used in light-colored foam stocks, whitewall tires, light-colored flooring and a long list of other light- and white-colored items. Users of GR-S 26 will find WING-STAY S already added when they purchase this rubber from the Office of Rubber Reserve.

*Photos courtesy of the Rubber Development Company, Kent, Ohio*

Write for full details and sample for your evaluation to:

**GOODYEAR, CHEMICAL DIVISION, AKRON 16, OHIO**

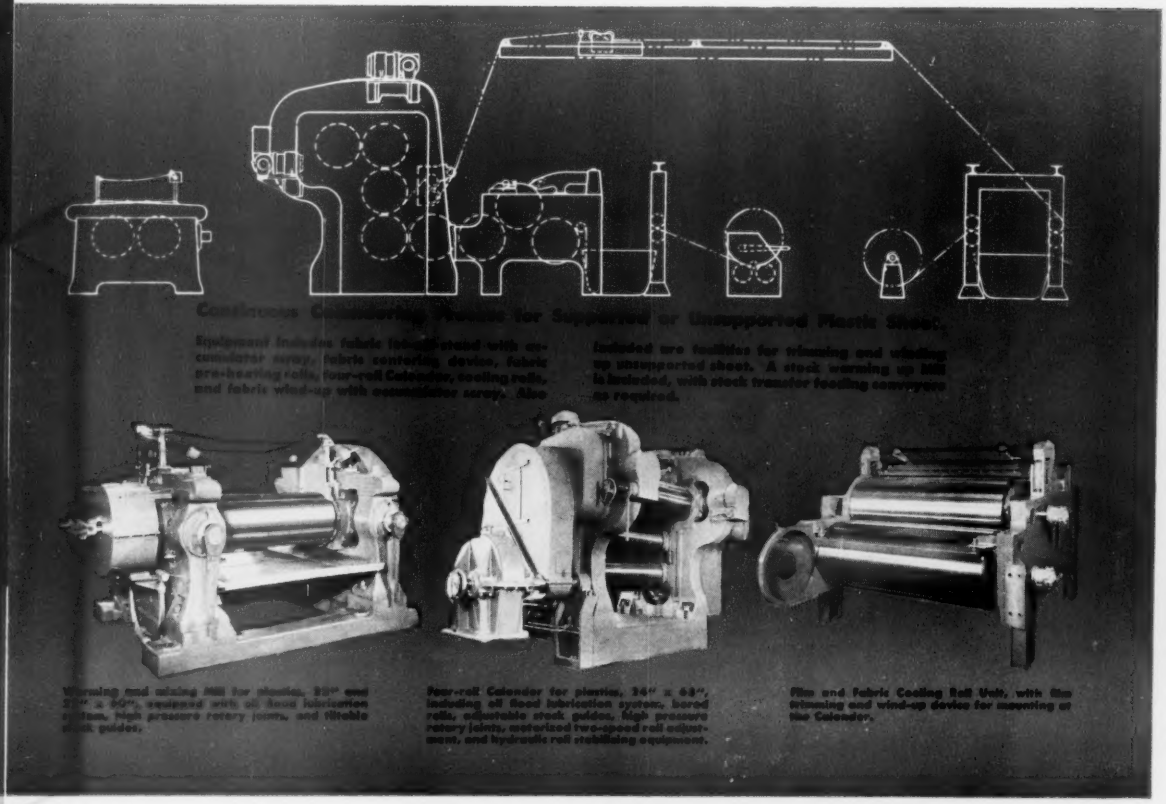
USE PROVED *Products*

**GOODYEAR**

Wing-Stay—T. M. The Goodyear Tire & Rubber Company, Akron, Ohio

# *Continuous Processes*

## FOR RUBBER AND PLASTICS



**Continuous Calendering Process for Supported or Unsupported Plastic Sheet.**

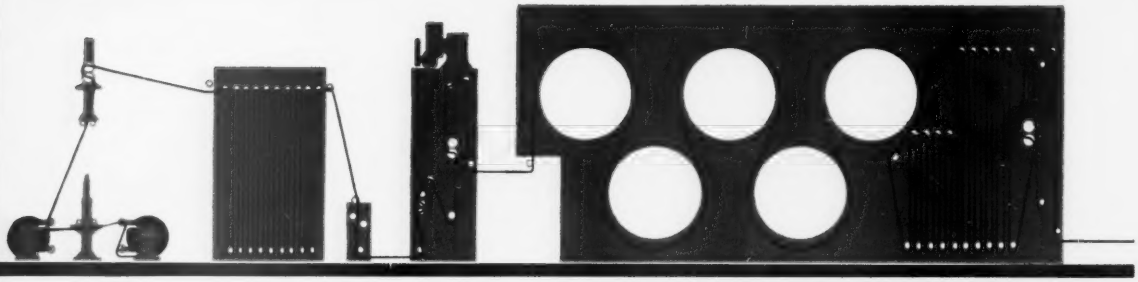
Equipment includes fabric festooned-type accumulator servey, fabric centering device, fabric pre-heating rolls, four-roll Calender, cooling rolls, and fabric wind-up with accumulator servey. Also included are facilities for trimming and winding up unsupported sheet. A stock warming up Mill is included, with stock transfer feeding conveyors as required.



Warming and mixing Mill for plastics, 22" and 22" x 60", equipped with oil hand lubrication system, high pressure rotary joints, and tiltable stock guides.

Four-roll Calender for plastics, 24" x 68", including oil feed lubrication system, bored rolls, adjustable stock guides, high pressure rotary joints, motorized two-speed roll adjustment, and hydraulic roll stabilizing equipment.

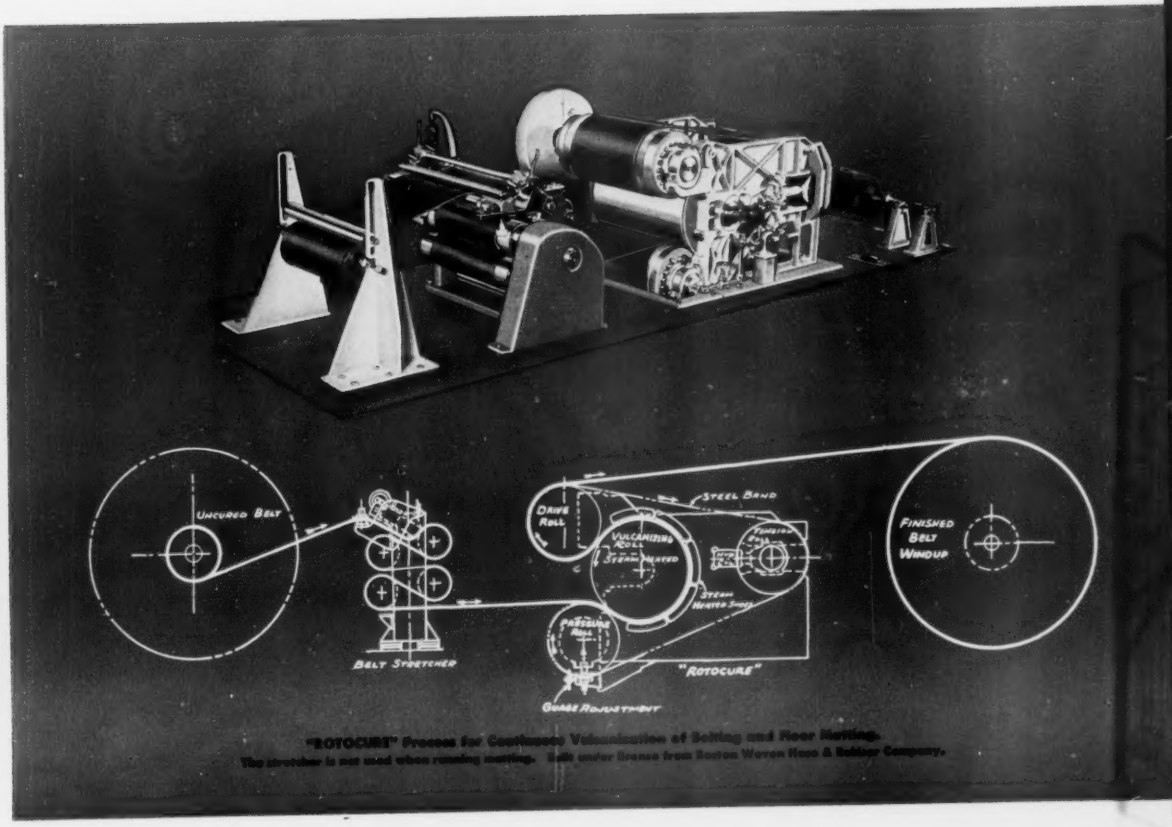
Film and Fabric Cooling Roll Unit, with film trimming and wind-up device for mounting at the Calender.



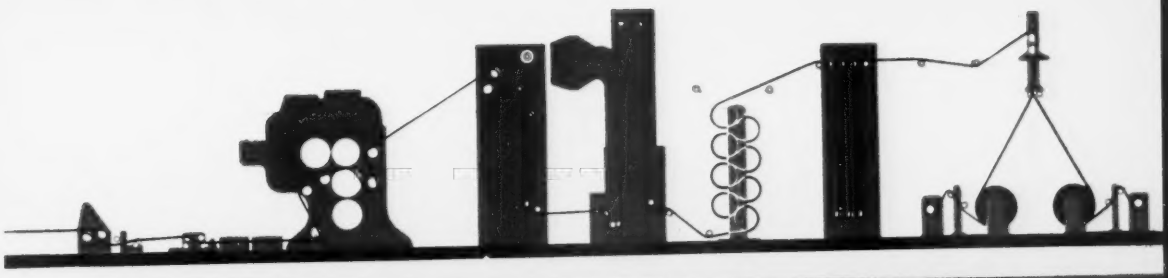
**Continuous Tire Fabric Processing Unit.**
**This double coating train includes pre-dipping, drying, calendering, cooling, and wind-up equipment.**

***We engineer, build and install continuous processing equipment for the manufacturer of rubber or plastics products. Your inquiry concerning special or unusual requirements is invited. Our engineers are available for consultation.***

# *Improve product quality–lower product cost*




"ROTOCURE" Process for Continuous Vulcanization of Belting and Floor Matting.
The stretcher is not used when running matting. Built under license from Boston Woven Hose & Rubber Company.




ADAMSON UNITED COMPANY
AKRON, OHIO
SUBSIDIARY OF UNITED ENGINEERING & FOUNDRY COMPANY
Branch Offices in Principal Cities

# Wyandotte Bicarb cures a rubber headache

Take it from this rubber manufacturer, you need a good blowing agent to make good sponge rubber. Time was when he used straight bicarbonate of soda. Its irregular particle size caused uneven porosity in his finished product, and lumps formed during storage made it difficult to measure.

Then a Wyandotte representative dropped in and remembered that Wyandotte Better Blend Soda, a specially treated bicarbonate, had solved a similar problem of flowability and uniform particle size in the baking industry.

The manufacturer found that Better Blend Soda gave his sponge rubber even porosity and a better "skin," was free-flowing and non-caking – and less expensive than any other type of blowing agent.

Result: this manufacturer has easier handling, fewer rejects – a *better product* at *less cost*. He now uses Wyandotte Better Blend Soda in 95% of his sponge rubber. Why not write today to see how Wyandotte can help *you?*

SODA ASH • CAUSTIC SODA • BICARBONATE OF SODA
CALCIUM CARBONATE • CALCIUM CHLORIDE • CHLORINE
HYDROGEN • DRY ICE • SYNTHETIC DETERGENTS • GLYCOLS
CARBOSE (Sodium CMC) • ETHYLENE DICHLORIDE • PROPYLENE
DICHLORIDE • AROMATIC SULFONIC ACID DERIVATIVES
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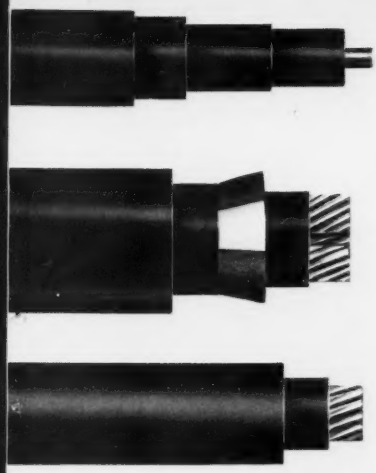
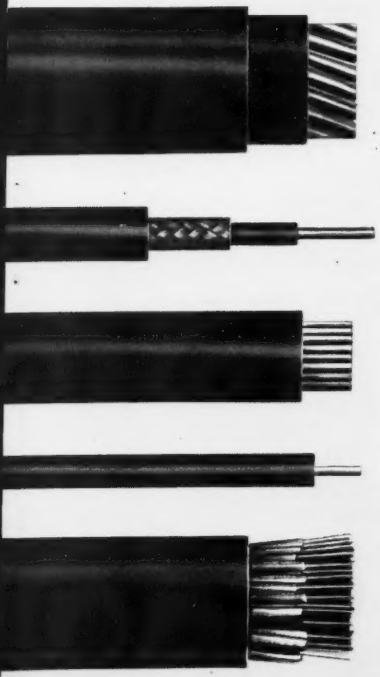
REG. U. S. PAT. OFF.



*When it's* PELLETEX® *you KNOW...*

# Insulated Wire will stand up to Rough Treatment

# PELLETEX®



If you want wire jacket stocks to last longer, without premature cracking and tear, use PELLETEX – its superior aging, tensile strength, abrasion resistance and resistance to solvents is the best. What's more, the low cost of PELLETEX can actually help you to save money.

Stocks compounded with PELLETEX will not only prove their worth in the beginning – they'll preserve their good qualities after long service. PELLETEX has splendid aging properties which make its compounds resistant to oil, grease, chemicals and the solvents likely to be around a garage, machine shop, factory or mine. The special SRF properties of PELLETEX make it easy to tube wire jackets smoothly and help them to hold their shape.

There's not another black anywhere to match the outstanding performance of PELLETEX. Only PELLETEX can give you low-cost wire jacket stocks of such exceptional, uniform high quality. With PELLETEX, insulated wire will last.

## The GENERAL ATLAS Carbon Co.

CABOT

77 FRANKLIN STREET, BOSTON 10, MASS.

Herron Bros. & Meyer Inc., New York and Akron • Herron & Meyer of Chicago, Chicago
Raw Materials Company, Boston • H. N. Richards Company, Trenton
The B. E. Dougherty Company, Los Angeles and San Francisco • Delacour Gorrie Limited, Toronto

# Campbell SOAPSTONE DISPENSER

## Don't wait—here's the best dusting equipment for the long pull ahead!

Don't wait — order now! Install one or more Campbell Model 1404-8 Soapstone Dispensers for external and internal dusting. We can still give you very good delivery. Leading rubber companies are using the Campbell Soapstoner, some as many as 25 machines, in their dusting operations.

BELOW: The Campbell Bagloader, extra equipment for the Soapstoner. Fills the dusting chamber a bagful at a time. Saves time and labor. Insures a cleaner operation because the bag is fastened to the prongs in the box-like top while the dust drops into the chamber.

**Write, wire or call** us today for a price quotation and illustrated folder

**The FALLS ENGINEERING AND MACHINE CO.**
1734 FRONT ST. CUYAHOGA FALLS, OHIO
*Established 1917*

# NOW AVAILABLE—*New Witco Bulletin on M. R. Hard Hydrocarbon*

UP-TO-DATE INFORMATION on compounding, at low cost, with Witco M. R. (Hard Hydrocarbon) is detailed in the three sections of this fresh-off-the-press publication.

**SECTION I** describes the use of Witco M. R. #38 (Hard Hydrocarbon) in natural rubber compounds . . . such as automotive tire treads, bicycle tires, smooth tubing channel materials, molded slab shoe soles, code wire insulation, and ignition cable insulations.

**SECTION II** covers the use of M. R. #38 in GR-S compounds . . . such as automotive tire treads, smooth tubing channel compounds, garden hose tube compounds, high durometer materials, molded slab shoe soles, and ignition cable insulation.

**SECTION III** describes hard hydrocarbon test procedures, rubber mixing procedures, and rubber test procedures.

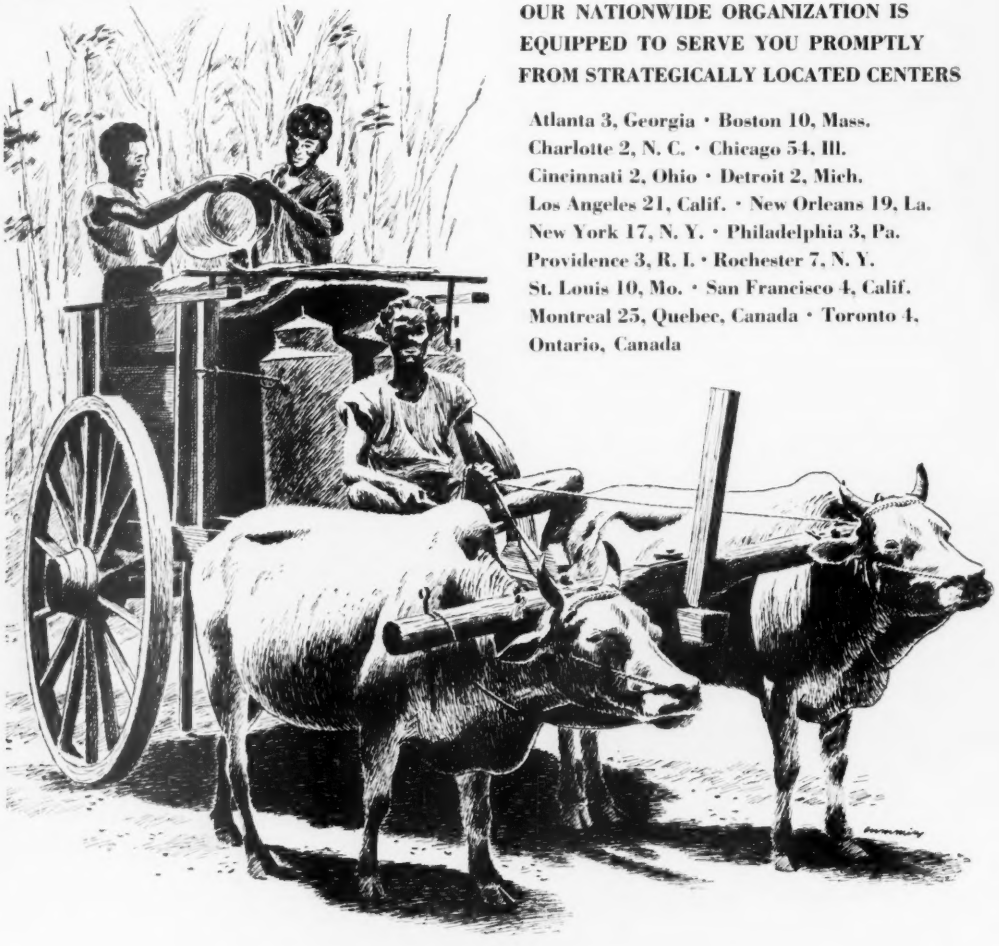
Consists of over 50 pages profusely illustrated with graphs and tables. Write today on company stationery to receive your copy. The supply is limited.

**WITCO**
**CHEMICAL COMPANY**

**295 Madison Avenue • New York 17, N.Y.**

Los Angeles • Boston • Chicago • Houston • Cleveland
San Francisco • Akron • London and Manchester, England

# Crude rubber
## *natural & synthetic latex*
## *latex compounds*



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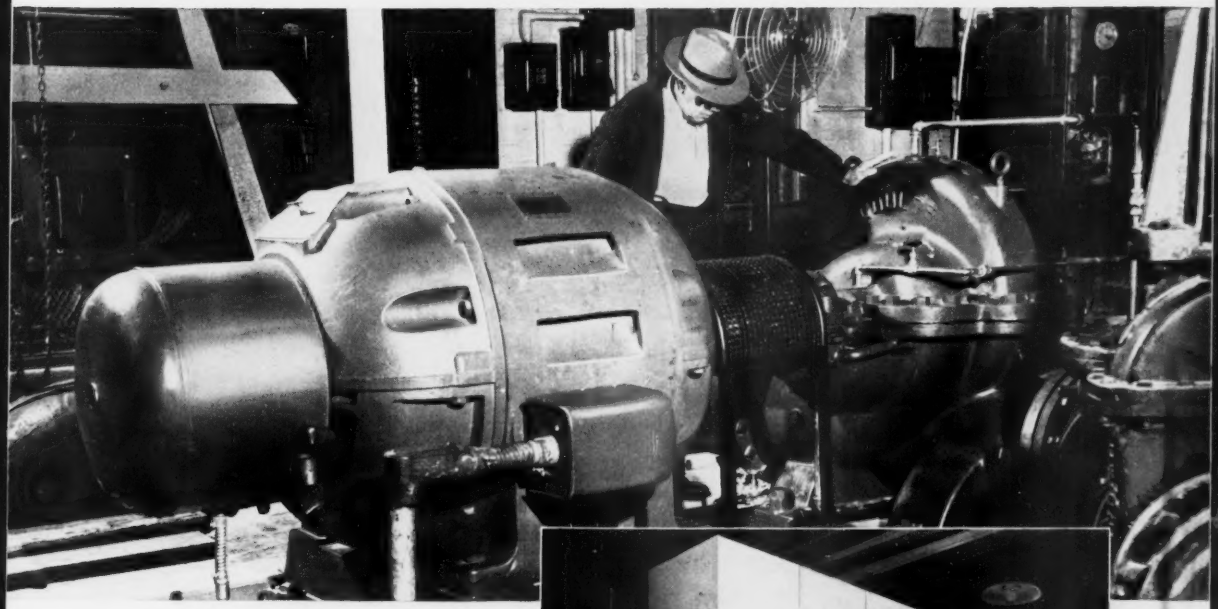
285 MADISON AVENUE — NEW YORK 17, N. Y.

Established 1866

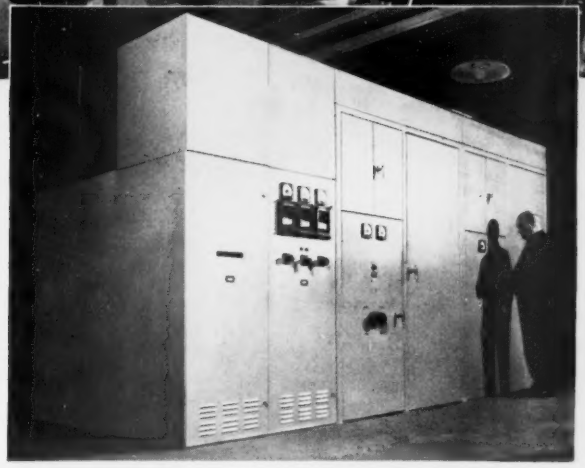
# Cohoes, N. Y. protects pumping plant equipment



# with G-E Limitamp high-voltage control

Recently, Cohoes installed a new 500-horsepower G-E synchronous motor on a raw water pump. Before they selected control the city engineers wisely decided on a complete study of the power supply. Working with the G-E sales engineer they determined the available short circuit capacity of the system was 60,000 kva. The destructive potentialities of this power obviously called for an "insurance" that would protect their investment.

**G-E Limitamp was the "insurance".** It answered every need. In addition to controlling the motor, its co-ordinated design, using current-limiting EJ-2 fuses, will clear shorts in less than half a cycle—well before damage can occur to motor or control. Extra dividends in the new smaller size, protection to personnel, reduced installation, engineering, and maintenance costs are inherent in this equipment, too.



*G-E Limitamp installed at Cohoes, N. Y. for control of two 500-horsepower motors*

**For your high-voltage installation** ask for G-E Limitamp—now available in ratings up to 4800 volts with an interrupting capacity up to 250 mva. Protect your power system and motors with G-E Limitamp—more information in Bulletin GEA-5409. Ask the nearest G-E office for this bulletin or write Section 730-23, *Apparatus Dept., General Electric Company, Schenectady, N. Y.*

GENERAL ELECTRIC

730-23

Do your rubber products have
the sniff that **sells?**

Use Du Pont **"Alamask"** odorants
TRADE MARK

Give your rubber products more customer appeal with "Alamask" odorants! Often times, it's the sniff that *sells*

Here are some specific—and successful—end uses for new "Alamask" odorants: For rug underlays (natural and synthetic, open or closed cell structure): "Alamask" LD, "Alamask" 6390, "Alamask" O. For blown natural-sponge pillow and mattress stock: "Alamask" O. For shoe adhesives, from natural latex: "Alamask" ND, from synthetic latex: "Alamask" 6337, "Alamask" 175. For rug backings: "Alamask" LD, "Alamask" ND. For natural smoke sheets: "Alamask" O.

Du Pont **"Alamask"** odorants
TRADE MARK

**Find out more!** Send for the booklet "Odorants for the Rubber Industry"—or ask us for specific recommendations for your individual problems. Write—E. I. du Pont de Nemours & Co. (Inc.), Organic Chemicals Department, Aromatics Section, Wilmington 98, Delaware. Branch Offices: Atlanta, Boston, Charlotte, Chicago, New York, Philadelphia, Providence, San Francisco.

DU PONT
REG. U.S. PAT. OFF.

**BETTER THINGS FOR BETTER LIVING . . . *THROUGH CHEMISTRY***

# MILLIONS

## *...of miniature factories...*

United channel blacks are remarkable products wrested from hydrocarbon gases in miniature flames that are starved for air.

United channel blacks stem from over four million precisely regimented flame factories where each particle of black is refined in incandescent heat.

United channel blacks are collected by impingement in the nascent state and they retain their innate activity in support of high reinforcement of rubber.

United channel blacks have been in use for decades and have an enviable record of satisfactory performance. They are uniform, dependable, and ever in demand.

Think of channel black — United channel black — for durable rubber products.

**UNITED CARBON COMPANY, INC.**
**CHARLESTON 27, WEST VIRGINIA**
NEW YORK · AKRON · CHICAGO · BOSTON

# *QUALITY CHECKED*
# *CARBON BLACKS*
## *DIXIEDENSED 77 (EPC)*
## *DIXIEDENSED HM (MPC)*

*UNITED CHANNEL BLACKS*
***bags are printed with your pigment number***

*UNITED CHANNEL BLACKS*
***conform to your specifications***

*UNITED CHANNEL BLACKS*
***handle exceptionally well***

*UNITED CHANNEL BLACKS*
***are of uniform quality***

*UNITED CHANNEL BLACKS*
***are always dependable***

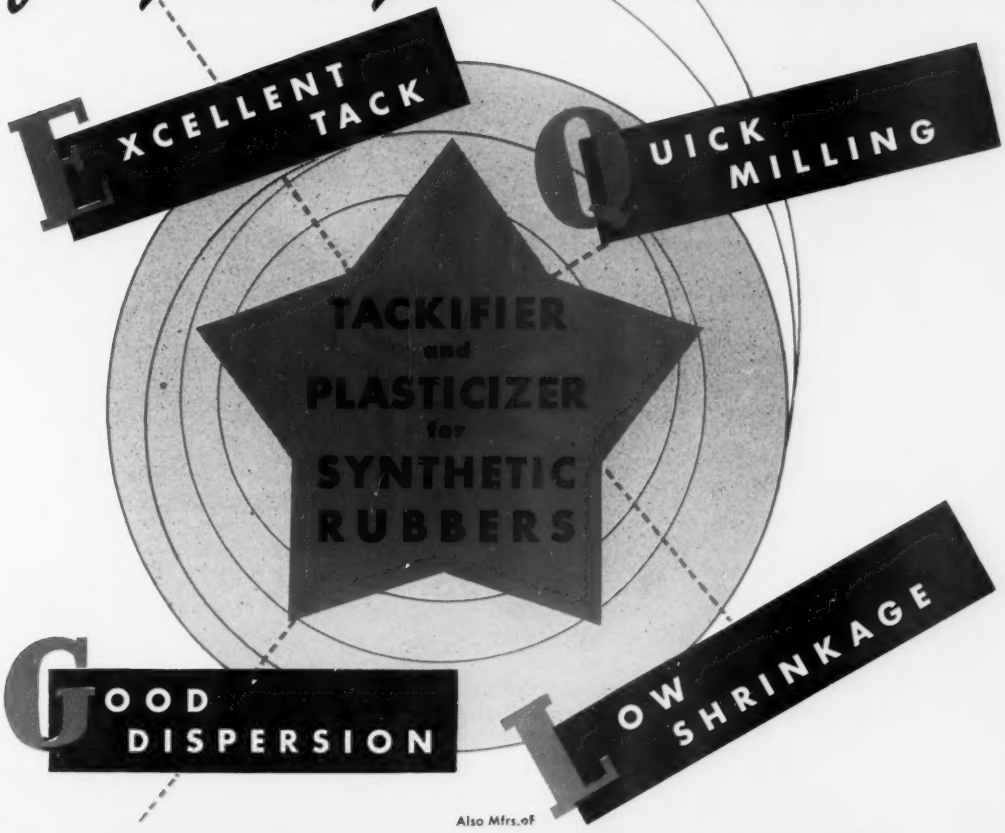
*UNITED CHANNEL BLACKS*
***are the standard for quality the world over***

**RESEARCH DIVISION — UNITED CARBON COMPANY — CHARLESTON 27, W. VA.**

*Investigate these Qualities of*

# SYNTHOL

*for your Synthetic Production*

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**RUBBEROL** INTERNAL LUBRICANT AND ***GLYCERIZED LUBRICANT*** FOR SLAB COATING & MOLD RELEASE

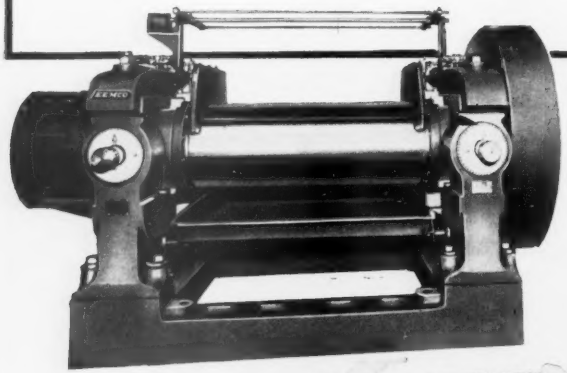
QUALITY SINCE 1884

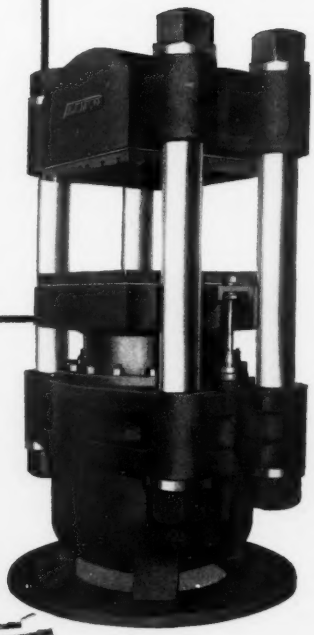
**GENSEKE BROTHERS**

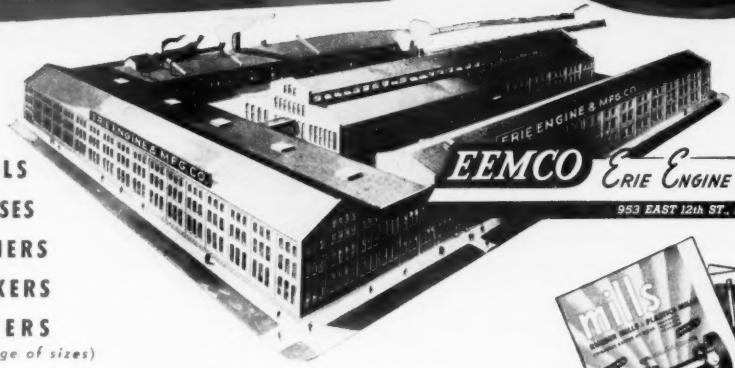
RUBBER MATERIALS DIVISION

West 48th Place and Whipple Street Chicago 32, U.S.A.

# Heavy Duty
# MILLS AND PRESSES








**MILLS**
**PRESSES**
**REFINERS**
**CRACKERS**
**WASHERS**
*(Complete range of sizes)*

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In this large modern factory rubber and plastics machinery has been built for the past 35 years. With installations throughout the world, EEMCO mills and presses are built for long life and heavy duty and are made by expert craftsmen to give unexcelled performance. EEMCO has its own Foundry, Machine Shop, Engineering Department, and Assembly Floor to insure fast delivery. Before you buy, get price and delivery dates from EEMCO.

Send for latest mill and press folders. Compare price, performance and shipment of EEMCO rubber and plastics processing machinery before you buy.

**EEMCO** *Erie Engine & Mfg. Co.*

*953 EAST 12th ST., ERIE, PENNA.*

***RUBBER and PLASTICS MACHINERY DIVISION***

# AVAILABLE to retard oxidation and flex cracking

Monsanto has *available for immediate delivery* three products with proved-in-service efficiency for retarding oxidation and flex cracking in such products as shoe soles and heels, tires, cable jackets and mechanicals. All of these antioxidants are effective in synthetic rubber, in natural rubber, in reclaimed rubber.

**SANTOFLEX B**—1.0 to 2.0% of Santoflex B gives excellent results in retarding flex cracking and oxidation; 3.0 to 4.0% gives high resistance to weathering and flexing.

**SANTOFLEX BX**—A preferred antioxidant for retarding oxidation and flex cracking. It mildly activates accelerators of the thiazole type. Use not over 2.0% to avoid blooming.

**SANTOFLEX 35**—The choice of many manufacturers for retarding oxidation and flex cracking. It mildly activates thiazole-type accelerators. Blooming can be avoided by using not over 1.0%.

For technical information on these and other Monsanto Chemicals for the Rubber Industry, contact MONSANTO CHEMICAL COMPANY, Rubber Service Department, 920 Brown Street, Akron 11, Ohio.

## MONSANTO CHEMICALS FOR THE RUBBER INDUSTRY

**ANTIOXIDANTS**

Flectol® H
Santoflex® B
Santoflex BX
Santoflex 35
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Santowhite® Crystals
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**ALDEHYDE AMINE ACCELERATORS**

A-32
A-77®
A-100

**MERCAPTO ACCELERATORS**

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El-Sixty®
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**GUANIDINE ACCELERATORS**

Diphenyl Guanidine (D.P.G.)
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*the star performer*
*for separating lightweight stocks*

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LINERETTE is furnished in any width up to and including 54", in rolls of 9", 11½", 13", and 15" diameters; put up on 3" i. d. cores. The yield is approximately six square yards to the pound. A 9" roll contains 375 linear yards and a 15" diameter about 1150 linear yards.

**SAMPLES SENT ON REQUEST**— *simply specify width desired.*

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Did you know that the Pittsburgh Coke & Chemical Company now produces plasticizers too? Pittsburgh PX Plasticizers are just one of the groups of basic products we're supplying to the important plastics industry. Many of the coal chemicals which we produce—phenol, cresol, benzene and phthalic anhydride, to name just a few—are vital to the production of plastics, rubber and protective coatings for both peacetime and military production.

When you see the Pittsburgh Coke & Chemical Company name or trademark, remember that they represent a basic, integrated organization supplying industry and agriculture with a wide and diversified family of useful products.

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PLASTICIZER DIVISION

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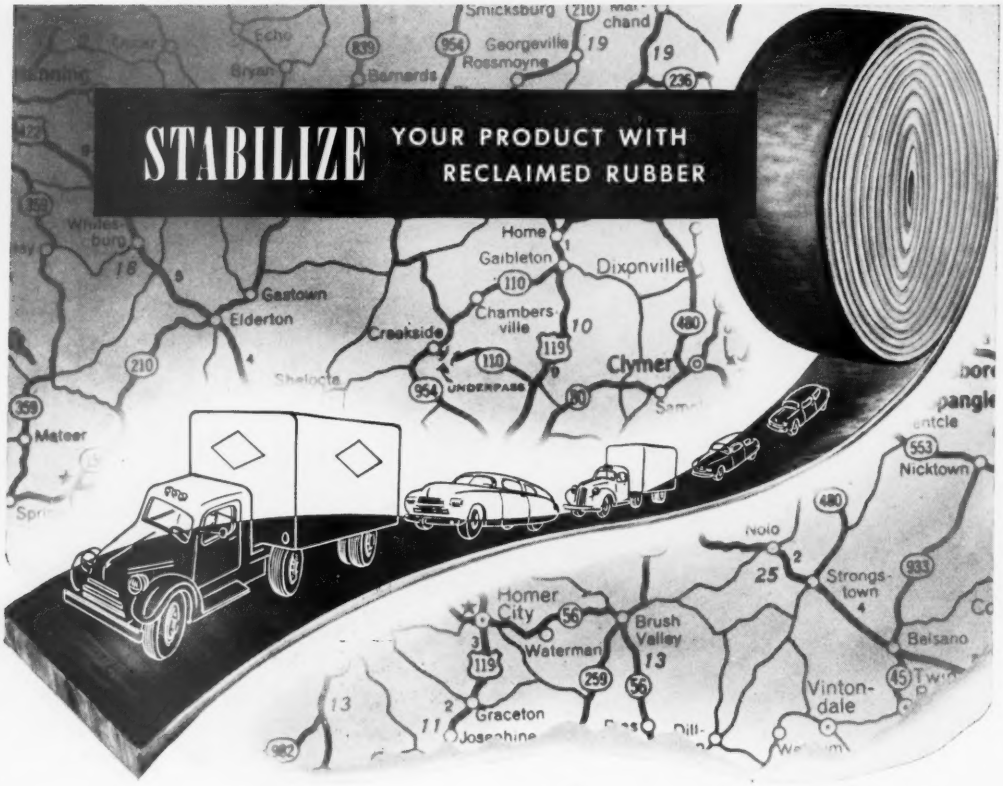


# U.S. RECLAIMS help produce *Camelback*

**. . . to keep the nation on its wheels!**

To keep producing, America must keep rolling! Not only the huge cargo trucks that supply our factories with raw materials and parts and our stores with food and clothing, but the autos of our workers themselves, the buses, ambulances, police cars and fire protection vehicles all rely on rubber. Now during this present emergency, the use of crude must be restricted. Tire recapping is obviously the answer and the production of Camelback is skyrocketing. Naturally, U. S. RECLAIMS are playing an important part in this picture.

Whatever you make out of rubber, remember that it's good business to always keep a substantial percentage of reclaim in your formulae. You'll find it far easier to STABILIZE your quality, STABILIZE your production and STABILIZE your cost. Plus that . . . you'll get faster mixing, easier processing and MAKE YOUR NEW RUBBER GO FARTHER.

Always keep reclaim in your formula and always look to U. S. for the best. U. S. Rubber Reclaiming Company, Inc., P. O. Box 365, Buffalo 5, N. Y. Trenton agent: H. M. Royal, Inc., 689 Pennington Ave., Trenton, N. J.

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*68 years serving the industry solely as reclaimers*

U.S. RUBBER RECLAIMING COMPANY, INC.

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## PLASTICIZERS

in Rubber, Resinous, and related Compositions

*has increased tenfold in the last 5 years*

If you are not one of our customers, are you on our list for circulars covering general and specific uses?

*Now Available for plant scale tests*

## INDOIL PEPTIZER 51

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An exceptionally active chemical softener . . . gives minimum shrinkage of milled and extruded stocks . . . minimizes break-down time . . . is non-staining . . . has no effect on rate of cure.

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# HOW TO INCREASE YOUR

## NEW PROCESS PROVIDES ECONOMICAL RECLAIM OF ALMOST ANY NATURAL, GR-S OR BUTYL SCRAP

With present shortages, and the uncertainties of the outlook for the future, no material containing rubber should be burned or thrown away before investigating its reclaiming possibilities. Today, practically all types of factory waste or scrap can be economically reclaimed and added to your supplies.

The Banbury Rubber Reclaimer and Devulcanizer now makes it possible to reclaim completely cured, partially cured or scorched stocks, and uncured trimmings, either separately or together, in one simple operation. The Banbury introduces mechanically induced heat and a working action at the same time. High speeds and high ram pressures result in high-temperature devulcanization.

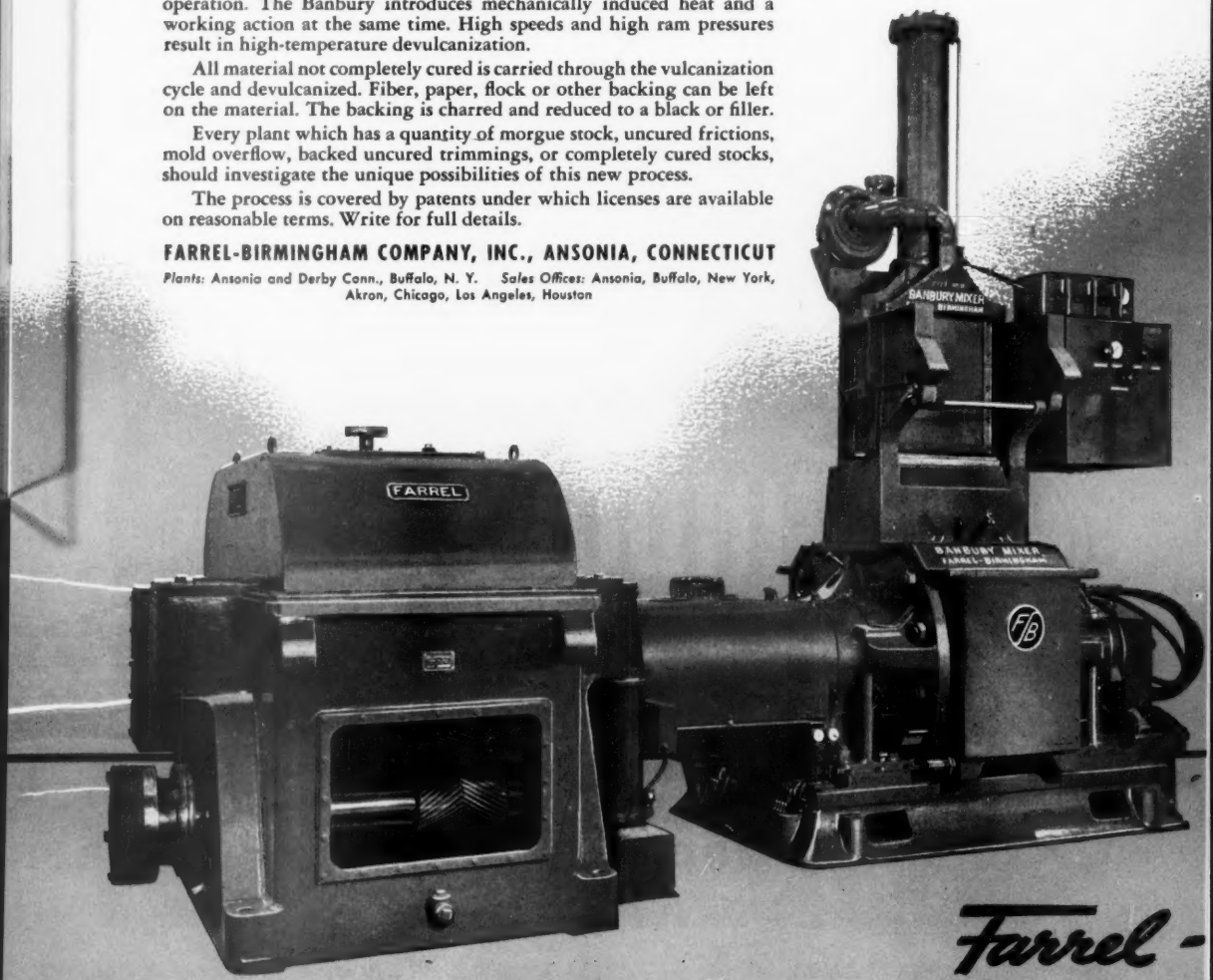
All material not completely cured is carried through the vulcanization cycle and devulcanized. Fiber, paper, flock or other backing can be left on the material. The backing is charred and reduced to a black or filler.

Every plant which has a quantity of morgue stock, uncured frictions, mold overflow, backed uncured trimmings, or completely cured stocks, should investigate the unique possibilities of this new process.

The process is covered by patents under which licenses are available on reasonable terms. Write for full details.

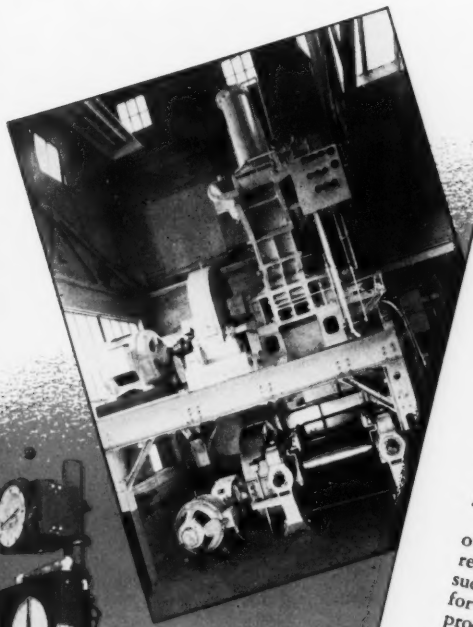
**FARREL-BIRMINGHAM COMPANY, INC., ANSONIA, CONNECTICUT**

*Plants:* Ansonia and Derby Conn., Buffalo, N. Y. *Sales Offices:* Ansonia, Buffalo, New York, Akron, Chicago, Los Angeles, Houston




Farrel -

# RUBBER SUPPLY



The size 11 Banbury Rubber Reclaimer and Devulcanizer processes from 3000 to 5000 lbs. per hour. It is of sturdier construction than the standard mixer to allow for the heavier load requirements. It has a Unidrive, high-pressure, self-sealing dust stops, and several other features essential to the process.

## A RECOMMENDED SETUP FOR PRODUCING HIGH QUALITY RECLAIM

For economical reclaiming in the factory, we recommend a size 3A Banbury Reclaimer and Devulcanizer with Unidrive, installed over a 60" mill, and with a 24" and 26" x 48" high-speed refiner adjacent to the mill. While it is often possible to load the scrap into the Banbury without cracking or other preparation, for ease of loading as well as a means of removing scrap metal, we recommend a cracker with the material passing over a magnetic pulley before going into the Banbury.

This layout is proposed after extensive tests carried on over the last few years, and the careful examination of the results provided by a number of recent installations. With such a setup, we have found that it is a simple procedure for the compounder to blend a variety of scraps together, producing a finished reclaim that is exactly what he needs for a particular purpose.

The figures given below are based on the following assumptions:

Power cost . . . . . 1¢ per horsepower hour
Labor cost . . . . . $1.65 per man per hour
Banbury output . . . . 1000 pounds per hour (this is a conservative figure)

| | Per Hour Cost | Per Pound Cost |
|---|---|---|
| **Power Cost** | | |
| Banbury (250 HP) | $ 2.50 | $0.0025 or ¼¢ |
| Mill (125 HP) | 1.25 | 0.00125 or ⅛¢ |
| Refiner (200 HP) | 2.00 | 0.0020 or ⅕¢ |
| Miscellaneous (125 HP) | 1.25 | 0.00125 or ⅛¢ |
| **Labor Cost** | | |
| 2 Men @ $1.65 per hour | 3.30 | 0.0033 or ⅓¢ |
| Totals | $10.30 | 0.0103 1 3/100¢ |

**NOTE**—Adjustments should be made for any differences in local power and labor costs. Add cost for "Overhead". No cost has been allowed for stock preparation as this is not always required.

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*Chemicals you live by*

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# LAMINATES

with DIAMOND PRECIPITATED CALCIUM CARBONATES

Laminators and molders find that smoother surfaces, elimination of cracks and of evidence of glass fibres result when DIAMOND Precipitated Calcium Carbonates are mixed with catalyzed, glass-reinforced polyester resins. This is due, in part, to the more even rate of cooling induced by the carbonate filler.

Other advantages in using DIAMOND Precipitated Calcium Carbonates are improved wet strength of the polyester resin, reduced shrinkage and, of course, *lower raw material cost.*

DIAMOND ALKALI offers several grades of Precipitated Calcium Carbonates, each chemically produced under carefully controlled conditions to assure day-to-day uniformity of particle size and purity.

Specifically recommended for reinforced polyester resins are:

**SURFEX*** — coated with 1% resin; particle size about 10 microns.

**SUSPENSO*** — same as SURFEX except uncoated.

**KALITE*** — coated with 1% stearic acid; particle size about 1 micron.

**MULTIFEX* MM** — uncoated, particle size about 0.06 micron.

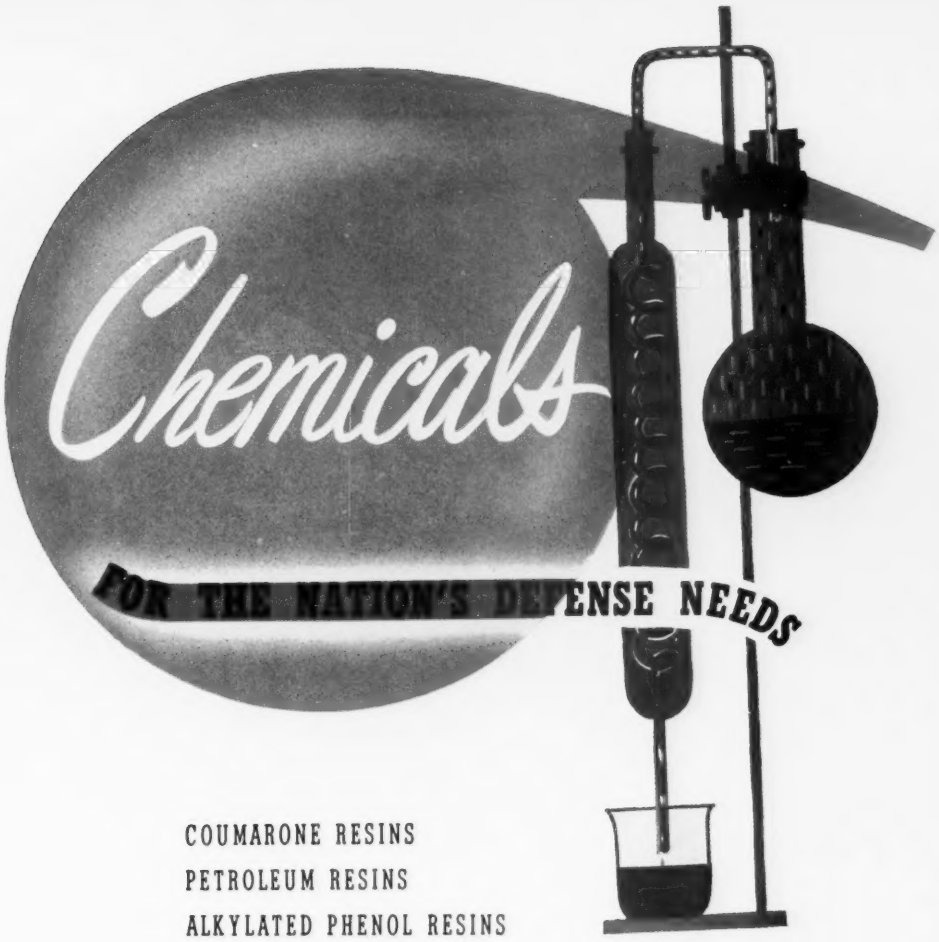
For further information write for DIAMOND's Bulletin "The Use of Precipitated Calcium Carbonates in Polyester Resins". Our Technical Service Staff is also available to assist you on formulating problems. *®

**DIAMOND SALES OFFICES:** New York, Philadelphia, Pittsburgh, Cleveland, Cincinnati, Chicago, St. Louis, Memphis and Houston. Also representatives in other principal cities.

**DIAMOND CHEMICALS FOR PLASTICS COMPOUNDING**

DIAMOND ALKALI COMPANY...CLEVELAND 14, OHIO

DIAMOND ALKALI CHEMICALS

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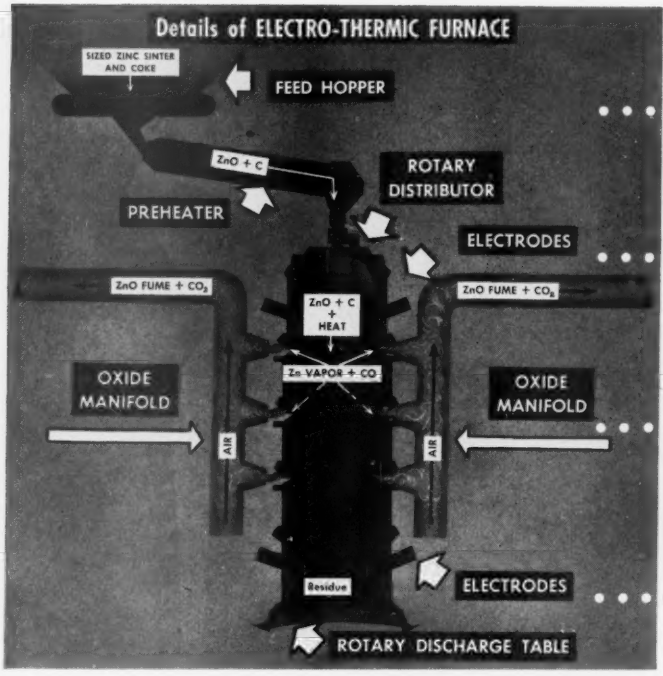
COAL-TAR SOLVENTS AND OILS
NEUTRAL AND SHINGLE STAIN OILS
RUBBER RECLAIMING OILS
CHEMICAL SPECIALTIES

**THE NEVILLE COMPANY** **NEVILLE** **PITTSBURGH 25, PA.**

*Plants at Neville Island, Pa., and Anaheim, Cal.*

A39

# *A Precision Instrument*




**four stories HIGH!**

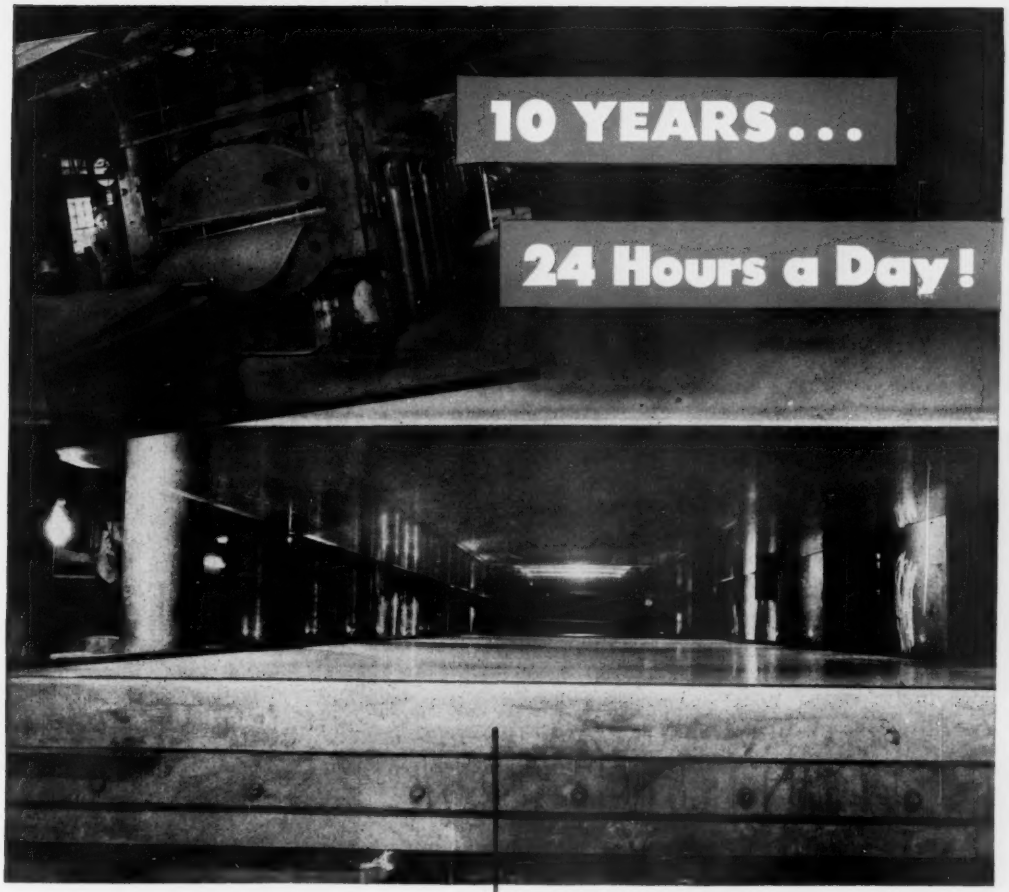
St. Joe lead-free Zinc Oxides in commercial quantities came on the market in February 1931. In the course of these 20 years, and as a result of an expansion program completed in 1950, this company's production of ZnO was increased twelve-fold to meet a corresponding increase in consumer demand. A high percentage of the additional tonnages of St. Joe Zinc Oxides thus produced are now being shipped to old-established consumers — but new to this company — who placed their initial orders at a time when zinc oxide in general was readily available.

Quality of product plus the reliability of this company is, of course, the answer. And the high quality of St. Joe ZnO is largely achieved through the medium of unique precision instruments, the largest of their type in the world: Electrothermic furnaces — the latest improvement in the smelting of zinc oxide by the American Process. This St. Joe Process produces a minimum of gases of incomplete combustion and thus makes possible closer control of the uniformity of zinc oxide where it is most important — at the point of oxidation. This control applies to both chemical composition and particle size. To produce the particle size pigments which require greater dilution of the vapor, the required volume of gases or air is supplied from an auxiliary source. By selection of operating conditions, it is possible by this method to impart characteristics to the finished product which are associated with both the French and other American Processes.

**ST. JOSEPH LEAD COMPANY**
**250 PARK AVE., N. Y. 17** • Eldorado 5-3200
Plant & Laboratory, Monaca (Josephtown) Pa.

**ST. JOE ZINC OXIDE** *from the standpoint of* **SUPPLY** *and* **DEMAND**

The continuing, unprecedented heavy demand is far greater than our capacity to produce. Hence, to equitably serve all of our regular customers, we are currently shipping to them monthly allocations based on the tonnages purchased during the first ten months of 1950. The only new customers receiving shipments are Government agencies.

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FOR EVERY PURPOSE • ACCUMULATORS •
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R.D. Wood Company

PUBLIC LEDGER BUILDING, PHILADELPHIA 5, PA.

*Established 1803*

The unretouched photograph above shows two 30′ x 5′4″ R. D. Wood press heating platens which have been turning out transmission and conveyor belting, packing, and similar industrial rubber products for the Thermoid Company of Trenton, New Jersey, for 10 years—working 24 hours a day.

Part of the R. D. Wood 3180 ton single opening hydraulic belt press pictured, these mirror-surfaced platens, in addition to the press itself, are still in excellent condition after over 87,000 hours of work, and give the Thermoid Company the quality it demands of its products, together with reduced production costs, fewer rejects, little maintenance.

Such performance from R. D. Wood hydraulic equipment can mean profit in *your* operations. R. D. Wood manufactures hydraulic presses and equipment for the rubber, plastics, plywood and metalworking industries. Write for information.

Production and quality control used to be at loggerheads all the time and Moe Muscles hated the lights and the liver of Inspector Mike. But that's over and done with now. Ever since Dow Corning introduced silicone mold lubricants to the rubber industry over five years ago, there has been a strange and unaccustomed peace between the pressman and the inspector.

That's because Dow Corning Silicone release agents give quick and easy release of even the most complicated parts from molds that stay clean much longer. High surface finish, uniformly sharp detail and closer tolerances come *by the drum* and non-knits, foldovers, loose tuck-unders and not-filled-out parts practically disappear.

***Dow Corning Silicones Mean Business!***

For more information call our nearest branch office or write for data sheet M-5.

*For More Production and Better Quality*
**SPECIFY**
**DOW CORNING SILICONE RELEASE AGENTS**

# DOW CORNING CORPORATION

DOW CORNING SILICONES

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*and many more to come....*

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with anything but
"Better than the best"
in natural rubber
or GR-S stocks?

# ANTIOXIDANT 2246

is the most active non-staining, non-discoloring antioxidant yet developed. Its activity results in the lowest net cost. Ask the man who has used it.

Specify the incorporation of Antioxidant 2246 when you place your orders for non-staining GR-S stocks through the Office of Rubber Reserve.

Calco®

AMERICAN Cyanamid COMPANY

CALCO CHEMICAL DIVISION
INTERMEDIATE & RUBBER CHEMICALS DEPARTMENT
BOUND BROOK, NEW JERSEY, U. S. A.

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DISPERSED RUBBER

# COLORS

give you **TOPS** in color value

Send for your copy of this color chart today.

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They are furnished as soft dispersions of organic toner and neutral polymer. They are unsurpassed for aging properties and will stand long storage and temperature changes. COOKE COLORS have high tinctorial value and give a clean, bright tone to the finished product.

They are quality colors for use in natural or synthetic rubber and in vinyls. They will stand all cures, are non-bleeding, and assure an *exact* color control of your products. COOKE COLORS are unmatched for depth of tone, high stability, permanence, and ease of handling.

**There are over 20 standard colors in the COOKE line—a color for every job. If the shade you need is not on our color chart, the colors can be blended to achieve precisely the shade you want. Or, if you prefer, we will supply reproducible blends to meet your individual requirements.**

Cooke

**COOKE COLOR & CHEMICAL CO.**

**GLEN ROCK, NEW JERSEY**

**Plant and Laboratory: Hackettstown, N. J.**

*24" x 36" Refiner Roll*

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Close co-operation with industry has given us an intimate knowledge of production problems and enabled us to make many important contributions to the development of modern, more efficient processing machinery.

When you are in need of roll renewals or are ready to specify for new processing equipment, consult us. Our engineering experience and production facilities are at your service.

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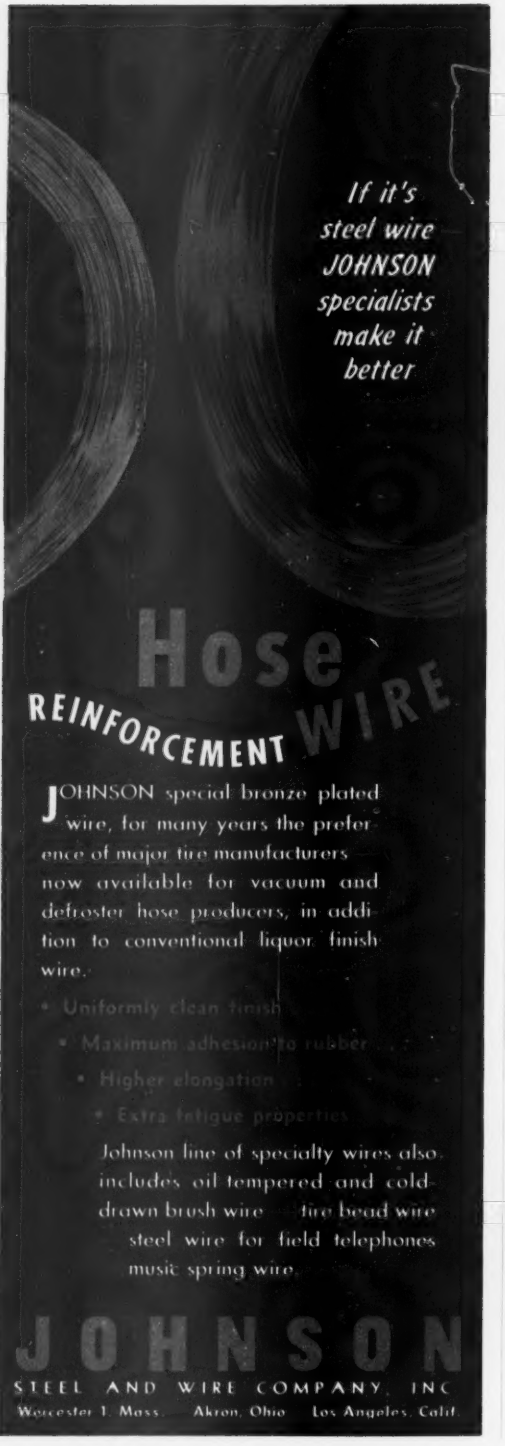
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JOHNSON special bronze plated wire, for many years the preference of major tire manufacturers now available for vacuum and defroster hose producers, in addition to conventional liquor finish wire.
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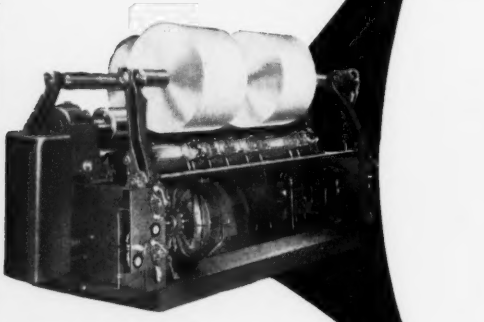

**OUTSTANDING FEATURES:**

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The new B&S #15 Duplex Rewinder is powered by a Louis Allis Eddy Current Type Variable-speed Drive. A variable volume pump driven by an A. C. motor supplies power to the rewind shafts, and the winder is powered by the Eddy Clutch. By placing the entire drive beneath the machine, B & S designers have saved valuable floor space.

Accurate pressure control and precision winding are achieved by pneumatic cylinders for raising and lowering the rewind arms. For full center winding rewind shafts can be locked in "out" position.

To eliminate all possible vibration, the B & S Duplex Rewinder is mounted on heavy cast-iron bedplate. Fully enclosed piping and easily accessible controls assure smoothness and efficiency in operation, as well as ease and economy in upkeep.

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These results are fairly common with Purecal U. In addition, Purecal U can be used to impart "building tack" to GR-S and Buna N compounds. It produces a base stock with carbon black quality which can be used *everywhere* that low gravity and high abrasion resistance are not a factor.

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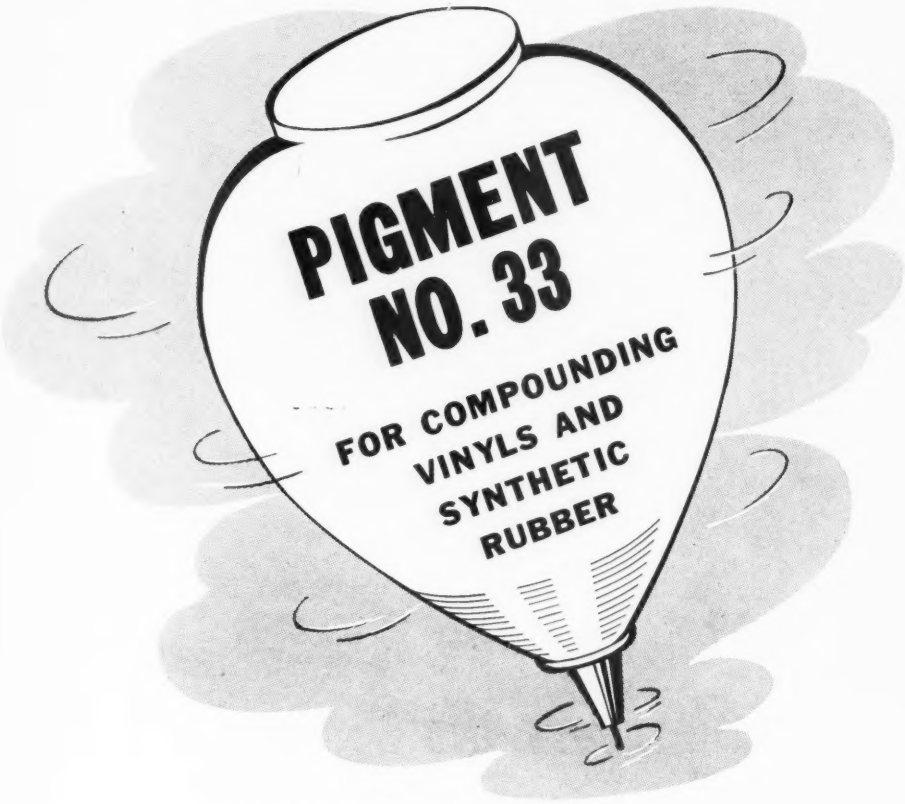


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**SUBLAC** Resin B-2-A is especially advantageous in stocks highly loaded with clay, whiting, or Silene. The following compounds are representative of such highly loaded, easy processing stocks that require no 'trick' mixing techniques:

| Experimental Slab Stock | |
|---|---|
| GR-S 521 | 100 |
| SUBLAC Resin B-2-A | 30 |
| Circo Light | 35 |
| ZnO | 5 |
| DPG | .15 |
| Altax | 2.13 |
| Hard Clay | 300 |
| Sulfur | 3.70 |

| Experimental Tile Stock | |
|---|---|
| GR-S 521 | 100 |
| SUBLAC Resin B-2-A | 30 |
| Circo Light | 15 |
| ZnO | 5 |
| DPG | .5 |
| Altax | 2.13 |
| Hard Clay | 200 |
| Whiting | 150 |
| Sulfur | 8 |

Cure 10′ @ 320° F

| | | | |
|---|---|---|---|
| Tensile | 950 | | |
| Elongation | 450% | | |
| Shore Hardness (A Scale) | 97-98 | Shore Hardness (D Scale) | 60-61 |

In these compounds, the **SUBLAC** Resin was added to the rubber, then enough clay to take up all of the oil, followed by the remainder of the ingredients in the usual manner.

**SUBLAC** Resin B-2-A is readily available. ***Send for your sample today!***

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Circosol-2XH is not an ordinary mineral oil. It's a petroleum-base process aid, refined within rigid specifications solely to meet the exacting requirements of rubber compounders. The product is a heavy viscous liquid, clear, transparent, and with a pale green color as observed by transmitted light. It is composed of hydrocarbons of comparatively high molecular weight entirely derived from selected crude petroleums. Its low volatility precludes any fuming and losses during mixing in the banbury and processing on the mills.

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## 4. CAN BE USED WITH ALL COLORS

Unlike products offered in competition with it, Circosol-2XH is a light-colored compound. It can therefore be used in such items as white footwear, hospital sheeting, white seals and gaskets.

## 5. GIVES GR-S EXTRA RESILIENCE

Circosol-2XH improves the rebound so necessary for many uses. Furthermore, heat build-up is low — in tire tread extrusion, for example.

### *"JOB PROVED"*

Circosol-2XH has been used by rubber processors for over seven years. Hundreds of them *know* from experience the high performance and durability of goods processed with Circosol-2XH.

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| GR-S-478 | 100.00 |
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| STEARIC ACID | 2.00 |
| SULFUR | 1.80 |
| SANTOCURE | 1.25 |
| CIRCOSOL-2XH | 10.00 |

### PHYSICAL PROPERTIES (60' cure @ 292 F)

| | |
|---|---|
| TENSILE, psi | 3455 |
| MODULUS (300%), psi | 1775 |
| ELONGATION, % | 505 |
| SHORE A HARDNESS | 59 |
| REBOUND (Goodyear-Healy), Room Temp. | 57 |
| HEAT BUILD-UP (Goodrich), deg. Fahr. | 68 |

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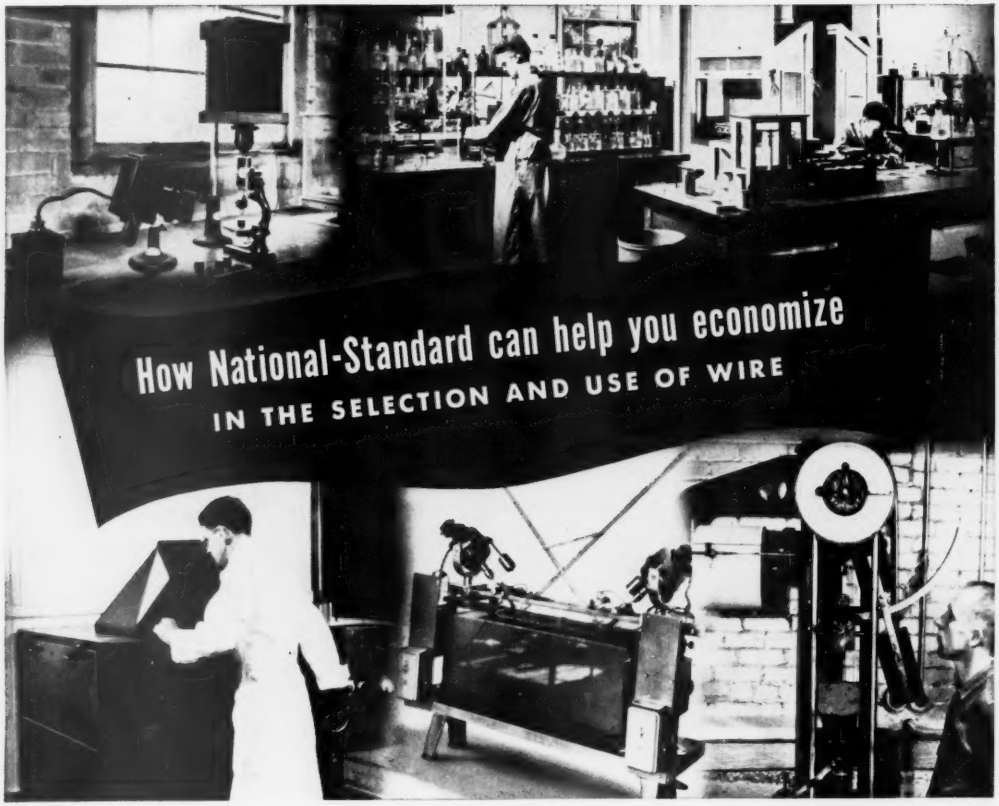


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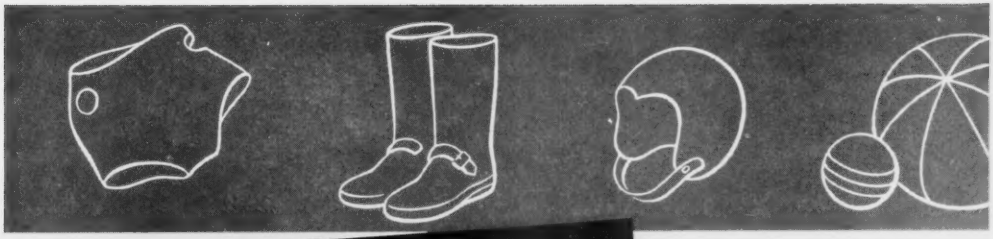
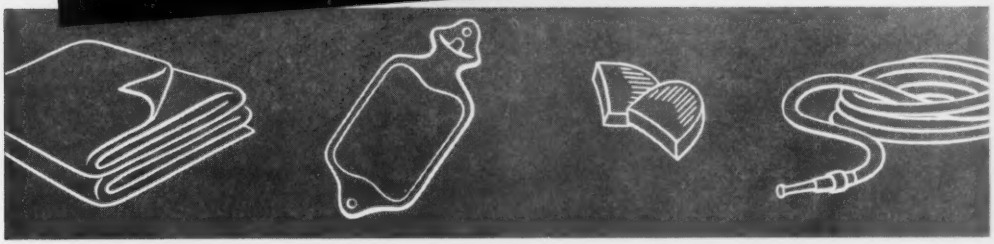
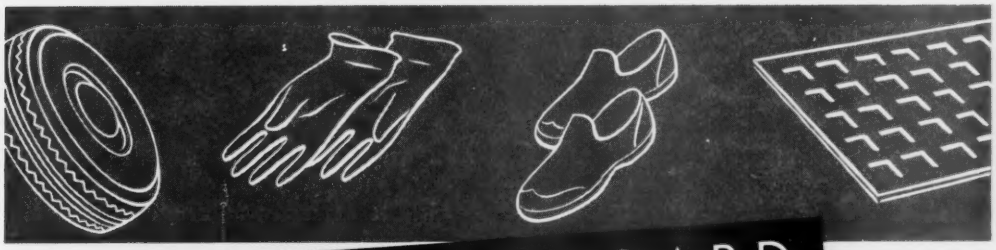


# TITANOX means



## whiter... brighter rubber products



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• In the steel industry campaign, Carnegie-Illinois Steel Corporation (now U. S. Steel Company), recently raised its payroll participation from 18% of 100,000 employees to 77% . . . Columbia Steel Company of California went from 7.9% to 35.2% . . . American Bridge Company signed 92.8% of the workers in the large Ambridge plant . . . 87% of Allegheny-Ludlum Steel Corporation's 14,000 employees are now on the Payroll Savings Plan . . . Crucible Steel Company of America, reinstating its plan, signed up 65% of its 14,500 employees.

• In the aviation industry, Hughes Aircraft Company went from 36% to 76%; Boeing Aircraft enrolled 10,000 new names before Christmas.

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BY WEIGHT ON 100 PARTS OF RUBBER

A supplement to THE ACTIVATOR—the house organ issued by The New Jersey Zinc Company for over 15 years to aid the Rubber Industry in its use of Zinc Oxide.

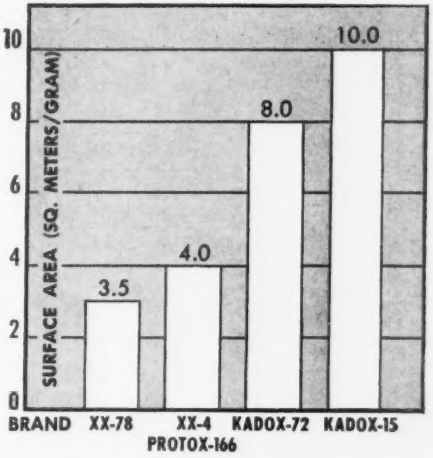
# *New Surface Area Values for*
# HORSE HEAD ZINC OXIDES

THE surface areas of the various brands of Horse Head Zinc Oxides, when measured by the $N_2$ adsorption method,* are from 30% - 65% larger than those derived from the electron-micrograph count method. The latter were previously reported in the March, 1949, issue of THE ACTIVATOR.

These findings stem from our extensive application of the $N_2$ adsorption method to a family of Zinc Oxides. Moreover, they represent an extension of the studies our Research Laboratories have been conducting on pigments for over thirty years.

Why the higher values? The $N_2$ adsorption method inherently measures the area of all particles; the count method estimates area through calculations based on length and width of a few hundred particles.

The new values for surface area are significant, as they accord more closely with the known processing and compounding properties of the individual Horse Head Zinc Oxides:




*Brunauer, Emmett and Teller, J. Amer. Chem. Soc. 60, 309 (1938).

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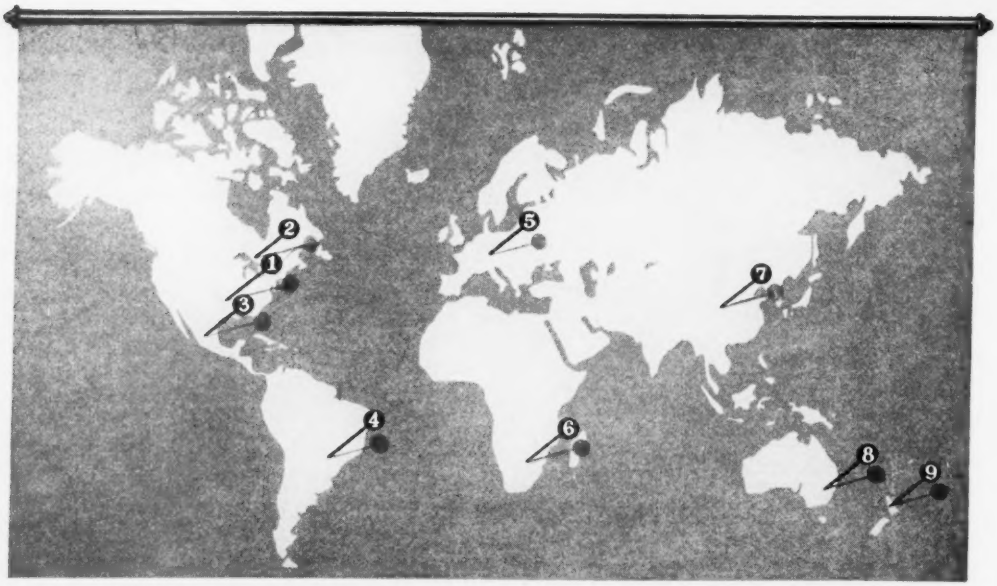


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VOLUME 69
NUMBER 2



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- ***Paracril BJ*** — Lower plasticity than Paracril B
- ***Paracril BV*** — Paracril B in Crumb Form
- ***Paracril C*** — Maximum Oil Resistance and Aging
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RUBBER AGE

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# Surface Oxidation of Furnace Black and Resulting Rubber Properties

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**One of the principal differences between furnace and channel blacks is the state of oxidation of the surface of the particles. A systematic study of the surface oxidation of an MAF and an HAF black, Philblack A and Philblack O respectively, has shown that all pH values between 9.5 and 3 can be attained by treatment with oxygen at temperatures between 700° and 1000° F. Such surface oxidation in addition to reducing the pH of the black, increases the volatile content and the surface area but does not necessarily involve any appreciable loss as volatile carbon oxides. Study of the rubber reinforcing properties of the oxidized blacks in natural rubber mixes indicates the state of cure of the vulcanizate to be more important than the pH level of the black. Scorch time, which shows a regular increase with decreasing pH, is an exception to this generalization.**

THE differences in rubber compounding behavior between furnace and channel blacks have been ascribed, among other things, to differences in volatile content. It is common knowledge that EPC blacks contain 4 to 5 per cent volatile matter whereas furnace blacks usually contain less than 1 per cent. From studies of devolatilized channel black, Wiegand *(1)* showed that pH and volatile matter had an inverse relationship, e.g., high volatile gave low pH. More recently, Wiegand and coworkers *(2, 3)* have studied a series of furnace and channel blacks of varying pH and volatile content as well as particle size and surface area. From these data the conclusion was drawn that there is no correlation between total volatile matter or its composition and rubber reinforcing properties.

While such a statement may be true, it is unfortunate that the data represent a series of different blacks rather than a series of variable volatile content in one black. It is, however, well recognized that the curing characteristics of furnace and channel blacks are quite different. In fact, it has been pointed out *(4)* that furnace blacks are virtually inert as regards vulcanization effect; the process occurs essentially as in a mix containing no black. It would seem desirable to have rubber evaluation data on a single black in which the pH was varied so that the effect of volatile matter on rubber properties might be evaluated.

Rather than devolatilize channel black, it would be more desirable to oxidize the surface of furnace black thereby not only obtaining data on rubber reinforcement properties, but gaining an insight into the oxidation process itself. Thus, Stokes and Dannenberg *(5)* have classified the treatment of furnace blacks with oxygen (as well as $CO_2$ and $H_2O$) into two categories: (1) A lower temperature process in which the concentration of oxygen complexes ($C_xO_y$) increases with little loss of carbon as oxide; as surface saturation is approached extension of the surface becomes marked while the oxygen content continues to increase, and (2) The higher temperature process results in large surface ex-

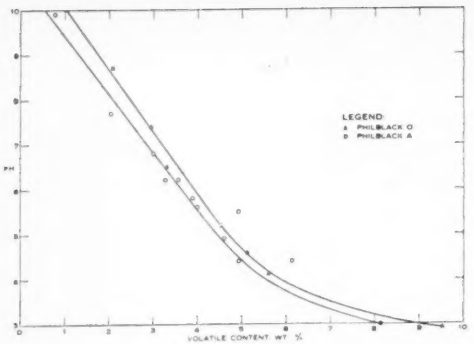


*FIG. 1—Relationship between volatile content and pH.*

tension, rapid loss of carbon as an oxide and small increase in surface oxygen. Neither type of oxidation produces any significant change in particle size.

To study the effect of progressive surface oxidation, Philblack A (MAF) and Philblack O (HAF) blacks were subjected to controlled oxidizing conditions. The products of the controlled oxidations were subjected to physical tests and their rubber reinforcing characteristics established.

## Experimental

*Materials:* The furnace blacks used were regular production samples of pelleted Philblack A and Philblack O which are representative of two important classes of commercial furnace blacks. Wyex was used in rubber tests as a representative of EPC channel blacks. The oxidizing agent was dried, $CO_2$-free laboratory air, which was diluted with cylinder nitrogen as desired.

*Apparatus:* Two apparatus were used in this investigation. The first was a small horizontal rotary glass kiln, 4 in. I.D., equipped with an internal stainless steel squirrel cage to tumble the black through the oxidizing gas stream. The kiln was rotated within an electrically-heated furnace which was wired to make the temperature gradient within the kiln reasonably uniform, i.e., the average spread in temperature over the length of the bed of black was of the order of 5 to 10° F. To maintain control over the oxidation process in this unit, it was essential to dilute the air with nitrogen.

The second apparatus was specially designed to provide circulation of a bed of pellets by the oxidizing gas stream. It consisted of a hollow truncated glass cone supported coaxially within a vertical glass cylinder the internal diameter of which was somewhat larger than that of the base of the frustrum. The cone was located approximately ¼-inch above a fritted glass disk sealed into the base of the outer cylinder. Gas entered the system from below the fritted disk. The velocity distribution of the gas was such that pelleted black was picked up in the gas stream and carried up through the truncated cone. Upon emerging from the frustrum, the linear velocity decreased below transport level and the pellets dropped out of the gas stream. They then flowed, by gravity, down through the annular space between the inner cylinder wall and the outside of the cone. An inverted Erlenmeyer flask situated above the treating section of the apparatus served as a disengaging space for material finer than normal pellets. The treating zone was located in an electrically-heated furnace. The heat transfer was so effective in this apparatus that no significant temperature gradient was observed between top and bottom of the treating zone.

All temperatures were measured by chromel-alumel thermocouples positioned within the treating zones. In each case, the oxidizing gas stream was metered and preheated in appropriate equipment. In general, Philblack A was treated in the kiln and Philblack O in the circulating bed unit.

## Results and Discussion

The results obtained by controlled surface oxidation can be subdivided into two natural categories: (1) the changes observed in the carbon black itself, and (2) the changes in the properties of carbon black-rubber mixes.

*Carbon Black Properties:* The most obvious effect of surface oxidation of furnace black is the increase of the carbon-oxygen complex which is reflected both in increase in volatile content and in reduction of pH. For the sake of simplicity, the pH of the black has been selected as the parameter which measures the extent of surface oxidation. While other measures might have been used, the correlation between changes in pH and in other properties has been found to be so consistent, that utilization of pH which can be easily measured *(6)* is warranted.

As would be expected on the basis of the work of Wiegand on pH of devolatilized black *(1)*, the volatile matter of surface oxidized black increases in quite regular fashion with decreased pH. Figure 1 shows that both Philblack A and Philblack O exhibit the same relationship between pH and volatile matter. At pH values above 5, there seems to be a nearly linear relation between the two properties but at lower pH values the relation is non-linear and the volatile matter begins to increase more rapidly. Thus, for Philblack O, the volatile matter at pH 6 is roughly 3.9 weight per cent while at pH 3 it has increased to 9 per cent. Along with increasing volatile matter, the oxidation also increases the surface area.

As can be seen in Figure 2, there is a regular progression in the BET *(7)* surface areas of surface oxidized Philblack A and O. There appears to be two linear sections to each curve, at pH values above 6 and below 5. In the lower pH range, the increase in surface area per unit decrease in pH is 52 $M^2$/gm, 5 to 10 times greater than the slope above pH 6. Some consideration of the nature of this newly developed surface may be of interest. Although reducing the pH of Philblack

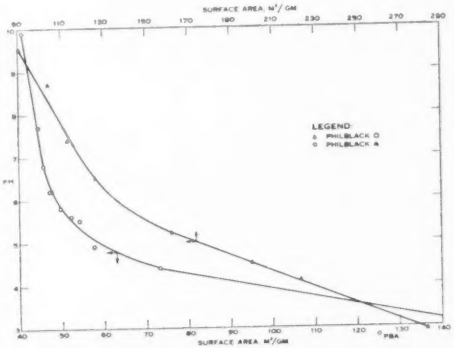


*FIG. 2—Effect of oxidation on surface area.*

TABLE I—OXIDATION OF PHILBLACK O

| Oxygen Conc. (%) | Temp. (°F) | Time (Min.) | pH | Burning Loss (Wt. %) |
|---|---|---|---|---|
| 2.7 | 815 | 100 | 8.9 | 1.6 |
| | 820 | 240 | 8.0 | 1.6 |
| | 820 | 350 | 7.4 | — |
| | 820 | 480 | 6.7 | 2.1 |
| 10 | 825 | 40 | 8.4 | 1.2 |
| | 810 | 120 | 7.4 | 0.9 |
| | 825 | 240 | 5.4 | 2.5 |
| 21 | 830 | 20 | 8.9 | 2.3 |
| | 835 | 40 | 7.6 | 1.0 |
| | 820 | 60 | 6.4 | 1.4 |
| | 820 | 120 | 5.1 | 1.2 |
| | 820 | 240 | 4.0 | 3.8 |
| | 815 | 520 | 2.9 | 6.9 |

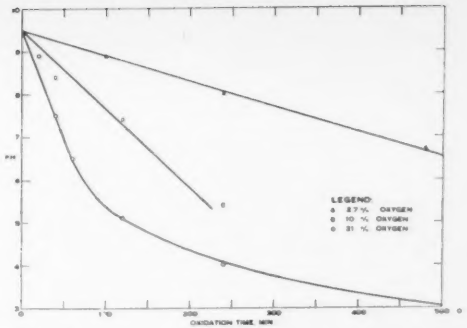


*FIG. 4—Rate of oxidation of Philblack O. (Temperature, 820° F.)*

O from 9.5 to 2.9 produced an area increase of 300 per cent, 90 to 280 $M^2$/gm, the weight loss of the black was only of the order of a few per cent. Electron photomicrographs of Philblacks oxidized to pH 4.9 and 3.0 showed no significant change in particle size as can be seen in the following tabulation:

| Electronmicrograph Diameter | Untreated Philblack A | Oxidized Philblack A, pH 4.9 | Oxidized Philblack A, pH 3.0 |
|---|---|---|---|
| Arithmetic Mean | 460 | 460 | 480 |
| Area Average | 540 | 530 | 545 |

With no particle size change and only small weight loss, the most probable means of developing such large areas arises from the formation of narrow pores or capillaries. That oxidation does develop narrow pores in the particles offers an explanation for the continuing discrepancy between particle size measurements of channel blacks by electron microscope and nitrogen adsorption. Since nitrogen adsorption measurements would include the area of narrow pores, calculations of particle size on the basis of area of non-porous particles would naturally lead to the BET particle size being smaller than electron microscope sizes.

When the specific surface volatility is calculated from the smoothed curves of pH vs surface area and pH vs volatile matter, rather interesting results are obtained, as shown in Figure 3. It appears that the concentration of surface complex increases with decreasing pH, as might be expected, down to values between 5.5 and 6.0. However, if the pH is decreased still further, the surface concentration of volatile matter appears to decrease with minima occurring at pH values between 4.2 and 3.5. Thereafter, the specific surface volatile matter increases. In the case of Philblack O, the concentration at pH 3 exceeds the maximum observed at pH 6. However, for Philblack A at pH 3 the specific surface volatility is still 30 per cent lower than the maximum.

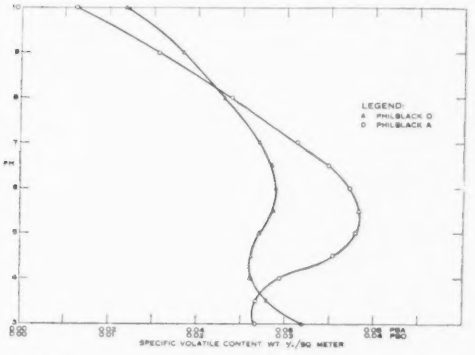


*FIG. 3—Specific surface volatility of oxidized Philblacks.*

It is also of interest to note that while Figure 1 shows that the weight per cent volatile matter for both HAF and MAF blacks are essentially equal at the same pH level, the specific surface volatilities differ by a factor of 2. Rather than a function of the concentration of surface carbon-oxygen complex, it would appear that pH is related to the total volatile matter in the sample of black tested. Since the pH is a measure of concentration of hydrogen ions in the liquid phase, the concentration of adsorbed ions on the surface of the black will not be observed by the pH meter. It simply indicates the total change in hydrogen ion concentration which in turn is related to the total adsorption and not the specific adsorption per unit area.

The rate of oxidation of the surface of Philblack O is shown in Figure 4 and Table I. Although there is some variation in temperature level, it is sufficiently small that the over-all picture is not obscured. As might be expected, the curves indicate that the oxidation is a function of the oxygen concentration, at least in the pH range above 6. In that region, the slopes of the curves are very nearly proportional to the oxygen concentration, e.g., the ratio of the slope of the 2.7 per cent oxygen curve to the 21 per cent one is 0.12 which is close to the ratio of the oxygen concentrations, 0.13.

Comparison with the 10 per cent oxygen curve is not nearly as close, but it can be seen that there is some uncertainty in the exact position of the curve for oxidation at that concentration. Consideration of the 21 per cent oxygen curve shows that when the pH of the black has been reduced below 6, an apparently different oxidation process is encountered. There is a radical change in the rate which is in line with the other changes observed in the properties of the black below pH 6.

It is probable that the development of narrow pores in which diffusion might be the rate-determining step becomes the predominant oxidation process.* In all oxidation studies, Table I, the weight loss of the black was quite low, usually running between 1 and 3 per cent. No

* In view of the temperature variation of the data, any more detailed analysis is unwarranted.

TABLE II—CHANGE (△) IN RUBBER REINFORCEMENT PROPERTIES OF OXIDIZED PHILBLACK O IN NATURAL RUBBER, 30 MIN. CURE

| | | | | △, % of Control | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Accel. Level | Sulfur | Black | Modulus | | Tensile | | Abrassion Loss[b] | | Compression | Accelerator | Scorch Time[c] |
| pH | PHR | PHR | PHR | Green | Aged | Green | Aged | Green | Aged | Set | Level | Min |
| 8.9 | 0.42 | 2 | 40 | —37 | —44 | — 3 | —29 | +18 | — 9 | +18 | + 5 | 30 |
| 8.9 | 0.50 | 2.5 | 50 | —17 | .. | — 2 | .. | — 5 | .. | .. | 0 | .. |
| 8.7 | 0.45 | 2 | 40 | —16 | — 9 | — 4 | — 8 | — 4 | + 2 | +14 | +13 | .. |
| 8.6 | 0.50 | 2.5 | 50 | —21 | .. | — 6 | .. | — 5 | .. | .. | 0 | .. |
| 8.0 | 0.44 | 2 | 40 | —16 | —23 | — 9 | —21 | +11 | + 6 | +14 | +10 | 32 |
| 7.3 | 0.46 | 2 | 40 | —13 | —18 | + 2 | —19 | +14 | .. | +19 | +15 | 32 |
| 6.7 | 0.48 | 2 | 40 | —16 | —19 | — 2 | —12 | +14 | +11 | +11 | +20 | 32 |
| 6.4 | 0.55 | 2 | 40 | — 3 | + 4 | + 3 | +19 | — 1 | — 7 | + 4 | +38 | .. |
| 6.4 | 0.70 | 2.5 | 40 | — 6 | +18 | — 2 | +21 | 0 | + 3 | + 3 | +40 | .. |
| 6.3 | 0.40 | 2 | 40 | —26 | +13 | — 5 | — 9 | — 9 | +14 | +30 | 0 | .. |
| 5.3 | 0.53 | 2 | 40 | —20 | —15 | + 2 | —12 | +22 | +18 | +11 | +33 | 35.5 |
| 5.2 | 0.60 | 2 | 40 | — 6 | + 2 | 0 | +19 | + 9 | —10 | + 4 | +50 | .. |
| 5.2 | 0.80 | 2.5 | 40 | — 4 | +12 | — 4 | +40 | + 8 | + 7 | — 2 | +60 | .. |
| 4.4 | 0.65 | 2 | 40 | — 5 | + 4 | + 3 | +35 | + 9 | + 4 | + 2 | +68 | .. |
| 4.4 | 0.90 | 2 | 40 | — 3 | +19 | + 4 | +47 | +15 | + 6 | — 6 | +80 | .. |
| 3.8[a] | 0.90 | 2 | 40 | +13 | +15 | +15 | +56 | +27 | +12 | — 5 | +68 | .. |
| 3.8[a] | 0.60 | 2 | 40 | +18 | + 7 | + 7 | +62 | +20 | +13 | + 3 | +125 | 35.5 |
| 3.5[a] | 0.65 | 2 | 40 | +11 | +15 | +15 | +40 | +13 | +20 | — 1 | +50 | .. |
| 2.9 | 0.60 | 2 | 40 | —52 | —64 | —36 | —47 | +53 | —12 | + 6 | +50 | 32.0 |

(a) Wyex. (b) 35 minute cure. (c) Mooney scorch at 250° F., Controls 17.5 and 24 minutes.

significant pattern was found relating the loss with pH because handling losses were too erratic and of the same order of magnitude. The very highest weight loss encountered was 6 per cent for a sample exposed to air for almost 9 hours at 820° F. (thereby reducing the pH to 2.9).

*Rubber Reinforcing Properties:* To facilitate graphical presentation of natural rubber tests of oxidized Philblacks in which different controls were used for each of the several tests, a rather unusual method of reporting the results has been employed. The changes in rubber properties are presented as percentage differences on the basis of the values obtained for the control. Thus, if the modulus for the control sample is 2000 psi and for an oxidized sample 1500 psi, the percentage change, △, is —25 per cent. All rubber properties, with the exception of scorch time, are handled in this fashion. All properties of the vulcanizates represent 30 minute cures at 307° F. unless otherwise noted. Typical compounding recipes used are as follows:

| | Philblack O | Philblack A |
|---|---|---|
| Natural Rubber (No. 1 S.S.) | 100.0 | 100.0 |
| Black | 40.0 | 50.0 |
| Zinc Oxide | 4.0 | 4.0 |
| Asphalt No. 6 | 6.0 | 6.0 |
| Sulfur | 2.0 | 2.5 |
| Accelerator | 0.4 (Santocure) | 0.5 (Captax) |
| Stearite | 3.0 | 3.0 |
| PBNA | 1.5 | 1.5 |

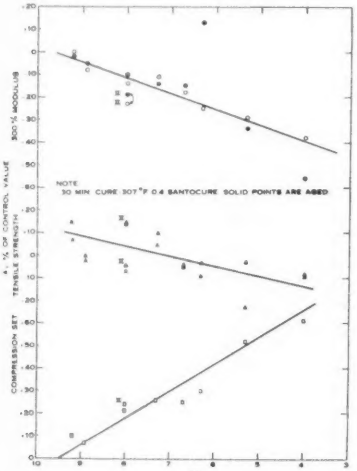


*FIG. 5—Effect of surface oxidation on reinforcement—Philblack O.*

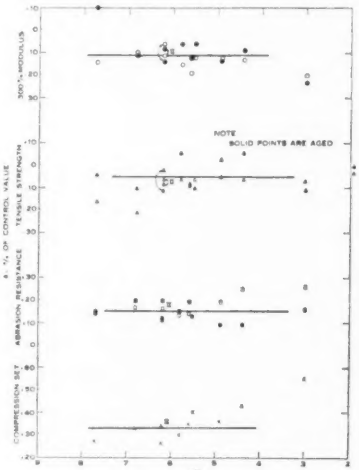


*FIG. 6—Effect of surface oxidation on reinforcement—Philblack A.*

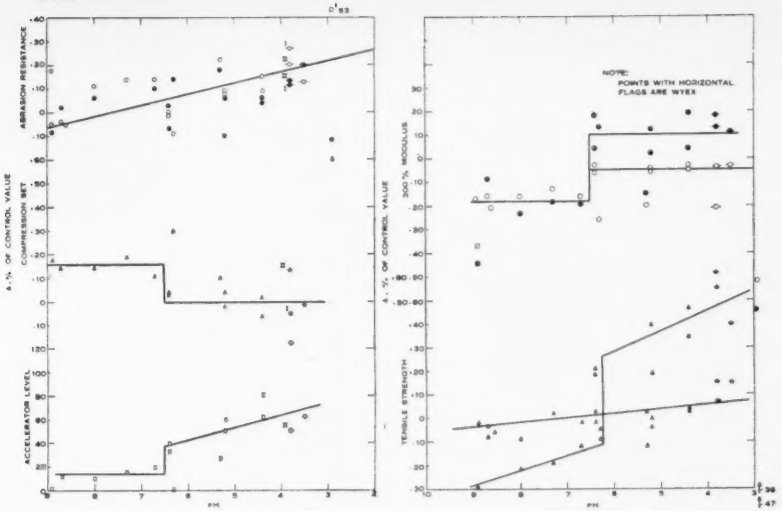


*FIG. 7—Effect of surface oxidation on reinforcement—Philblack O (with adjusted accelerator levels).*

Some tests were carried out in which the accelerator level was increased to compensate for the slower cure obtained with the lower pH samples. The tabulation of these rubber reinforcing data, Table II, indicates the deviations, if any, from these typical recipes. Tests with Wyex channel black were made with the Philblack O recipe using 0.6 to 0.90 parts Santocure.

In the examples involving Philblack O-natural rubber mixes with constant accelerator level, the properties reflect quite clearly the lower states of cure obtained with decreasing pH of the black. Thus, in Figure 5, both the modulus and tensile strength show progressive decrease in value with lowering pH, even though the tensile values for some of the higher pH values exceed the control. The modulus decreases nearly linearly with pH to a lower value which is 40 per cent below the control while at the same pH level the tensile is only 15 per cent less than the control. The state of cure is graphically indicated by the pronounced increase in compression set; at the lowest pH level, 4, the compression set exceeds the control value by roughly 60 per cent.

Similar tests on Philblack A show somewhat different behavior. It appears from the results shown in Figure 6 that the rubber properties of the MAF black are somewhat less sensitive to pH change than are those of the HAF black. At constant accelerator level, the compression set does not show the marked increase with pH lowering. The compression set for all the oxidized samples seems to be nearly independent of pH and is roughly 30 to 40 per cent above the control. This lower state of cure is reflected in the reduced modulus which likewise is nearly uniformly 10 per cent below control levels. Similarly, the tensile is 5 to 10 per cent low and abrasion loss is roughly 15 per cent higher.

When the accelerator level was adjusted in an effort to maintain constant states of cure, the results of rubber tests appear to be somewhat different (Figure 7). With the exception of the abrasion loss, the rubber properties revealed discontinuities in the region of 6 to 7 pH units. However, when the accelerator level used in these cures is studied, it is apparent that there is a rather sharp change in this same pH range. For that reason, it is probable that the discontinuity is once again a reflection of the state of cure of the rubber mixes and that equal cures were not actually obtained. There does appear to be a trend in the tensile strength values which is independent of the state of cure, i.e., increasing tensile strength with decreasing pH. It is of interest to note that a typical EPC black, Wyex, which was included in these studies falls into the over-all pH property pattern. In the instance of abrasion resistance, it would seem that the state of cure does not have an important influence. Reducing the pH of HAF black by one or two pH units apparently causes some slight improvement in abrasion resistance.

In Figure 8, the scorch times for both oxidized Philblack A and Philblack O have been plotted as a function of pH. In the example of the MAF black, the values were obtained at constant accelerator level while both constant and adjusted accelerator levels were employed

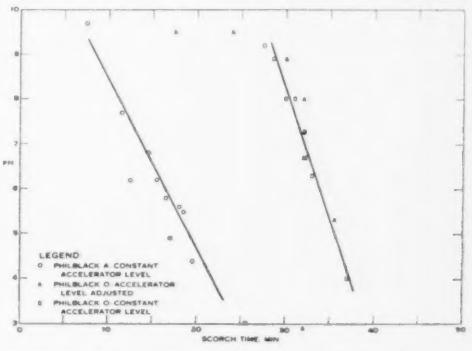


*FIG. 8—Effect of oxidation on scorch time in natural rubber.*

with the HAF black. It is quite clear that decreasing the pH produces a very marked and regular increase in the scorch time, which for Philblack O is independent of the accelerator level. The pronounced differences in scorch times between the two types of black stocks is attributable to the different accelerators used.

From the rubber results reported, it appears that the state of cure of the vulcanizates had considerably more influence on their properties than the state of oxidation of the blacks. With the exception of scorch time, it is probable that only moderate changes are produced in the tensile properties of the rubber-black mixes. Whether or not the decrease in abrasion resistance is inherent to the oxidized blacks or is due to a secondary effect on states of cure cannot be stated with certainty on the basis of present data.

ACKNOWLEDGMENT

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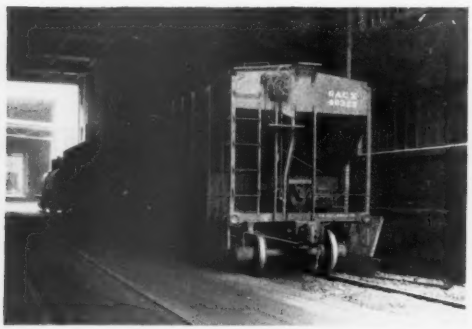
## Zipper Conveyor Belt for Carbon Black Handling at Goodrich

THE zipper conveyor belt, developed during the period 1940-47, is now being used by the B. F. Goodrich Co. for the handling of carbon black. What is said to be the first zipper conveyor belt to be used for this purpose is presently operating in Building 22 of the Goodrich installation in Akron. It moves 150 feet a minute, carrying 14,000 pounds of black an hour, raising the material from the railroad siding to the top of the building where the storage tanks are located.

The zipper belt replaces nine screw conveyors and greatly reduces the time needed to unload carbon black from a railroad car. Considerable savings will also be made in the purchase of carbon blacks by using the belt since it permits the purchase of pelletized blacks in bulk. Pelletized black is in the form of easily crushed beads the size of sugar grains. In vertical lifts, it breaks and clogs. The zipper belt, however, can take it straight up and around 90° corners.

Before the zipper was installed, the soft furnace blacks had to be bought in bags. The bags were delivered to Building 23 platform, unloaded, hauled by tractor to an elevator, delivered to the warehouse level, transferred to another tractor and stored until needed. Now the black is bought in bulk, a tank car load at a time, unloaded from the bottom of a tank car onto a short screw conveyor which takes it into Building 22. There it is picked up by the zipper belt, taken to the roof where another screw conveyor takes it horizontally into the storage tanks. Then it can be poured directly into the weigh hoppers and Banbury machines when needed.

The zipper conveyor belt when open is a flat belt about 6 inches wide with vertical sides. These sides are flexible and bend out flat when the belt goes around a corner. The sides are edged with zipper teeth made of rubber. When the belt goes through the closing point these teeth zip up like an ordinary zipper on clothing, forming the belt into a tube and concealing its load. The Stephens-Adamson Manufacturing Co. of Aurora, Ill., makes the zipper belt frame and sells the complete installation.



*This photograph depicts a carbon black tank car spotted besides Building 22. From its bottom the bulk carbon black pours into a horizontal screw conveyor which takes it into the opening of the zipper conveyor.*

*The topmost point of the zipper belt's continuous journey is in the diagonal shaft at right. Here on the roof of Building 22, the belt drops its carbon black onto the horizontal screw conveyor running to the storage tank.*

# Unique Conveyor Drying System Improves Mass Production of Latex Rubber Novelties

MASS production of latex rubber novelties, head masks and false faces by Bayshore Industries, Inc., at Elkton, Maryland, has been improved by the adaptation of direct-fired warm air industrial type space heaters with stainless steel combustion chambers to process drying operations at the plant.

The first company in the United States to manufacture rubber masks and false faces on a mass production basis by a mold dipping process, Bayshore needed a conveyor drying system that could keep pace with the output of dipping tanks with enough versatility for precise and speedy temperature regulation for varying oven loads. After other systems proved to be inadequate, the plant engineer decided the drying process would be most effective if large volumes of high temperature air were used. One of the two conveyor ovens was designed for use with a Dravo "Counterflo" space heater, a product of the Dravo Corp., Neville Island, Pittsburgh 25, Penna., equipped with special temperature-resistant bearings and a stainless steel combustion chamber.

In manufacturing masks, double-face plaster or aluminum molds are dipped into a mixture of rubber latex and chemicals. Water content of the mixture is 40 per cent and this has to be removed. Passage of heated air over objects to be dried was considered the ideal way to do this. Previously, it required about an hour to cure the rubber masks. Now, it takes only 27 minutes in the new oven.

Freshly dipped masks, on double-face molds, travel on a conveyor system into the lower section of a double-deck oven. This section is 3 feet deep by 106 feet long by 2 feet wide. Air temperature is maintained at 160° F. to solidify the rubber mixture on the mold and pre-cure it. As molds arrive at the end of the lower oven, the masks are hand-stripped by cutting them into two faces with hot knives. The face masks then are fitted to wire mesh formed domes attached to a continuous wire mesh conveyor running 68 feet through the upper oven. Temperature in the upper oven is maintained at 350 degrees to cure the rubber compound. Use of wire mesh for the conveyor enables good circulation of heated air around and inside the masks.

High temperature air is produced in the Dravo Counterflo Heater located in a lean-to outside the drying oven building. The heater has a capacity of 1,000,000 Btu per hour and is fired with No. 4 fuel oil. In operation, the heater draws air into its base by means of a fan rated at 11,000 cu. ft. per minute. The air passes first over staggered banks of economizer tubes which carry flue gases to the vent stack. Then it sweeps the heater's stainless steel combustion chamber and is discharged into a 14-inch by 67-inch supply duct. Temperature of incoming air is raised approximately 80 degrees during its travel through the heater. To produce the high temperatures, there is a 12-inch by 54-inch by-pass duct leading from the main supply duct to the air intake duct at the base of the heater. A manually-operated damper in the by-pass duct is used to balance the volume of air needed for recirculation to build up temperature. Fresh, outside air is drawn into the return air duct through a 24 by 24-inch louvered opening. This

*Mass production of these unique latex masks has been improved at the plant of Bayshore Industries, Inc., at Elkton, Md., by the installation of two direct-fired space heaters with stainless steel combustion chambers for a process drying operation.*

*The insulated duct on the left carries air from the upper oven to the lower oven. A Dravo Counterflo Heater forces air at a temperature of 350° F. into the upper oven for final curing of the latex rubber masks.*

*Stripping pre-cured rubber masks from two-faced molds with "hot knives." After being stripped, the masks are cured in a 350° F. oven.*

air replaces moisture-laden air vented from the oven through a stack.

The main air supply duct from the heater leads to the top of the upper oven and enters the oven through four slotted openings, the first one of which is 14 by 48 inches; the next two, 3 by 48 inches, and the fourth, 6 by 48 inches. This air, at 350 degrees, travels the length of the upper oven to a 30 by 30-inch duct leading to an insulated sheet metal hot air plenum 40 feet long under the lower oven. Air from the plenum discharges upward into the lower oven through 10 openings, 3½ inches wide by 18 inches long, spaced 4 feet apart. The return air duct to the heater is attached to the far end of the lower oven. All ductwork and the heater casing are insulated with Fiberglas.

The heater is turned on and off by a selector switch. Once turned on, operation is fully automatic. A temperature controller in the oven regulates the modulating burner of the heater. Thus, the heater automatically provides the proper temperature for varying loads on the conveyors. Temperature is controlled precisely with no lagging or override. Quality of the cured masks is better because of the temperature control. Moreover, since the heater is a self-contained unit, no piping has to be run through the plant or the ovens. The only piping necessary for the heater is the fuel oil line. The rapid-heating ability of the Dravo heater enables use of the ovens soon after a "cold start," following a weekend or other non-operating periods. Fuel is conserved because temperatures are built up quickly.

Use of temperature resistant stainless steel for the combustion chamber eliminates the need for refractory lining and prolongs the service life of the heater. Previous experience with refractory-lined heaters at the plant showed that after 15 months' operation at high temperature, the refractory had deteriorated badly. Following successful adaptation of the Dravo heater to this one oven about a year ago, the company recently equipped a similar oven with another 1,000,000 Btu unit that operates essentially in the same manner.

As a result of improved mass production methods, including the latex rubber curing process, Bayshore Industries has been able to reduce the price of its masks to a third of what they cost when the company started in business in 1946. The company manufactures a wide variety of rubber novelty items in addition to the face masks. With present facilities, the plant can turn out as many as 60,000 masks daily.

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**30 Year History in the Lighter Vein.** Foster D. Snell, Inc., 29 West 15th St., New York 11, N. Y. 8½ x 11 in. 32 pp.

This unique and amusing booklet recounts the activities and history of Foster D. Snell, Inc., and describes the consulting services which the firm offers in the chemical and engineering fields. Biographies of executive and laboratory personnel are provided, while cartoons, photographs and caricatures illustrate members of the staff at work and the facilities which the company employs in its work.

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**Lanolin (Wool Wax).** Croda Ltd., Snaith, Yorkshire, England. 5½ x 8½ in. 36 pp.

The chemical and physical properties of lanolin and its uses in a great diversity of industrial products are described in this interesting booklet. Of particular interest are the sections describing its use in plasticizers, rubber, resins and synthetic waxes and pigments. Different types of lanolin are described as are those properties which suit it to varied manufacturing processes. The publication contains a complete bibliography and an index.

**Wood's Production Facilities.** R. D. Wood Co., Independence Square, Philadelphia 5, Penna. 8½ x 11 in. 32 pp.

Designed to give an informative picture of some of the 150-year old firm's facilities, this booklet describes methods and equipment, particularly as they relate to the manufacture of hydraulic presses, valves and allied equipment. The various activities of the plant are outlined in text and photographs. The contribution of plant personnel to each step in the production of a finished article is defined.

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**Quick-Connective Couplings.** Hansen Manufacturing Co., 4031 West 150th St., Cleveland 11, Ohio. 11¾ x 9 in. 40 pp.

This catalog is composed of various loose-leaf bulletins, each of which incorporates complete information, engineering data, dimensions, etc., pertaining to any particular type of Hansen coupling, such as straight-through, one-way shut-off, two-way shut-off, or special service couplings for oxygen, acetylene, gasoline, steam or other applications. The catalog is profusely illustrated.

# Hydrogenated Rosin in Cold Rubber Tire Tread Stocks

By LYLE O. AMBERG

*Hercules Experiment Station, Hercules Powder Co., Wilmington, Delaware*

**With the advent of synthetic rubber polymerized at low temperatures and its rapid acceptance by the tire industry, it became desirable to learn whether the excellent properties of hydrogenated rosin (Staybelite) as a softener for GR-S and GR-S-10 would obtain when compounded with "cold" rubber. Staybelite, alone and blended with Rosin Amine D (predominantly dehydroabietylamine), has been found to be as effective a softener for cold rubber tire tread stock as it was previously found to be for conventional GR-S. Both channel black and furnace black reinforced compositions were used in this investigation.**

WHEN GR-S rubber first became available during the early part of World War II, little was known about it. Industry experience was limited largely to a relatively small-scale private production of a butadiene-styrene copolymer. That it was different from natural rubber was to be expected. Accelerator and sulfur levels had to be altered, and the polymer's poor flex life in tread compounds required improvement. Luckily, channel carbon black already was available in a highly developed form. Its remarkable reinforcing action on the butadiene-styrene copolymer made possible application of GR-S to tire compounding.

It was evident that in order to make the most of the possibilities of the new synthetic rubber, more softener would be needed than had been used with natural rubber. Also, there was little real reason to believe that the traditional natural rubber processing aids would be the most suitable for GR-S. Literally thousands of materials were tested—from pine tar to carnauba wax, from coal tar to garbage grease *(1)*.

During that period the Hercules rubber laboratory tested several hundred materials and combinations of materials, most of which were derived from either rosin or terpenes *(2)*. Of these many materials tested, it was found that two established materials, hydrogenated rosin (Staybelite) and disproportionated rosin (Hercules Resin 731) gave combinations of good building tack, low heat build-up, and good resistance to flex cracking, particularly after aging. Staybelite resin long has been used in natural rubber compounding and disproportionated rosin is contained in GR-S-10, having been incorporated as a Dresinate (alkali metal salt) emulsifier at the polymerization step.

Subsequent work showed that with high-grade non-black pigments, the best physical properties were developed when a "rosin" rubber (GR-S-10) was softened with Staybelite *(3)*. In many cases the tensile strength of the rosin rubber stocks softened with Staybelite were at least double that of a fatty acid rubber-coumarone indene counterpart.

In a study of reaction products of Staybelite, it was found that a fused blend of it with a minor amount of Rosin Amine D (predominantly dehydroabietylamine) offered faster cure and further improved all-around physical properties in rubber compounds *(4)*. Evidently, at least part of the desirable characteristics of the stabilized rosin was retained in converting to the amine.

With the advent of cold rubber (which, like GR-S-10, contains disproportionated rosin), and its rapid acceptance by the tire industry, the question arose as to whether the properties of hydrogenated rosin as a softener for GR-S and GR-S-10, would carry over to cold rubber. Also, almost simultaneously with the development of cold rubber came the high abrasion resistance (HAF) and very fine furnace (VFF) blacks which gave promise of some real improvement in tire compounds, particularly in combination with cold rubber. Contrary to the acid-type channel blacks, furnace blacks form alkaline slurries with water. It was desirable, then, to determine the effect of hydrogenated rosin in the presence of these new blacks which, potentially at least, could react with the stabilized resin acids contained in it.

Staybelite and a 90:10 blend of Staybelite with Rosin Amine D were tested in comparison with ordinary wood rosin and a typical aliphatic hydrocarbon polymer, Para Flux. Three softener levels were studied: 5, 10, and 15 parts per 100 parts GR-S; controls containing no softener were included for reference purposes. Micronex W-6 (EPC) was included in the channel black formula, and Philblack O (HAF) was selected for the loading material in the furnace black test stocks. The two basic formulas are shown in Table I and the test materials are described in the Experimental Section. For each softener level, a masterbatch of the basic formula was prepared and the resins were added to portions of it; a fifth portion was tested as the unsoftened control.

## Results with Channel Black

Tables II, III, and IV contain data obtained by testing specimens of vulcanizate compounded according to Formula A (Table I). Figures 1, 2, 3, and 4 show graph-

TABLE I—VULCANIZATE TEST FORMULAS

(Parts by Weight)

| | A Channel Black | B Furnace Black |
|---|---|---|
| X-485 GR-S | 100.00 | 100.00 |
| Micronex W-6 | 50.00 | — |
| Philblack O | — | 50.00 |
| Santocure | 1.25 | 1.00 |
| Zinc Oxide (XX-4) | 3.00 | 3.00 |
| Stearex Beads | 2.00 | 2.00 |
| Age-Rite Powder | 1.25 | 1.25 |
| Sulfur (Tube Brand) | 2.60 | 1.80 |
| Softener | 0 to 15 | 0 to 15 |

TABLE II—CHANNEL BLACK LOADED X-485 GR-S TIRE TREAD CONTAINING 5 PARTS RESINS

| | Using Staybelite | | Using 9 Staybelite—1 Rosin Amine D | | Using N Wood Rosin | | Using Saturated Hydrocarbon Polymer | | Using No Softener | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Unaged | Aged* | Unaged | Aged* | Unaged | Aged* | Unaged | Aged* | Unaged | Aged* |
| Compounded Viscosity (Mooney) "ML" rotor, 4 min. at 212° F..... | 68.5 | — | 71 | — | 72 | — | 70.5 | — | 80 | — |
| Modulus at 200% Elongation, lb./sq. in. | | | | | | | | | | |
| Cure at 307° F., 15 min..... | 160 | 835 | 190 | 1165 | — | 910 | 250 | 1215 | 330 | 1525 |
| 30 min..... | 450 | 1560 | 540 | 1700 | 370 | 1390 | 580 | 1610 | 765 | 2110 |
| 60 min..... | 735 | 1690 | 740 | 1615 | 600 | 1435 | 725 | 1400 | 980 | 1925 |
| 90 min..... | 765 | 1530 | 760 | 1490 | 675 | 1260 | 700 | 1320 | 990 | 1810 |
| Tensile Strength, lb./sq. in. | | | | | | | | | | |
| Cure at 307° F., 15 min..... | 1905 | 3820 | 2885 | 2895 | 2625 | 3530 | 3725 | 2700 | 3795 | 2975 |
| 30 min..... | 4105 | 3370 | 4275 | 3285 | 4440 | 3555 | 3820 | 3045 | 4070 | 2875 |
| 60 min..... | 3875 | 3180 | 4145 | 3255 | 4385 | 3665 | 3945 | 2810 | 3800 | 2710 |
| 90 min..... | 3950 | 3355 | 4190 | 3380 | 4220 | 3480 | 3890 | 3105 | 3760 | 3190 |
| Elongation at Break, % | | | | | | | | | | |
| Cure at 307° F., 15 min..... | 1100 | 580 | 950 | 380 | 1015 | 510 | 885 | 355 | 770 | 320 |
| 30 min..... | 705 | 360 | 655 | 330 | 750 | 415 | 620 | 335 | 545 | 255 |
| 60 min..... | 545 | 325 | 540 | 335 | 625 | 405 | 560 | 330 | 465 | 250 |
| 90 min..... | 530 | 350 | 530 | 365 | 595 | 405 | 550 | 375 | 440 | 305 |
| Hardness (Shore "A") | | | | | | | | | | |
| Cure at 307° F., 15 min..... | 43 | 63 | 46 | 68 | 45 | 67 | 50 | 67 | 55 | 72 |
| 30 min..... | 57 | 70 | 58 | 71 | 57 | 70 | 60 | 70 | 64 | 74 |
| 60 min..... | 60 | 71 | 60 | 71 | 60 | 72 | 61 | 70 | 65 | 75 |
| 90 min..... | 62 | 72 | 62 | 70 | 62 | 71 | 62 | 70 | 66 | 74 |
| Rebound Resilience (Bashore), % | | | | | | | | | | |
| Cure at 307° F., 15 min..... | 36 | 37 | 34.5 | 36 | 35 | 34.5 | 36 | 39 | 38 | 40 |
| 30 min..... | 35.5 | 32 | 32.5 | 32 | 32.5 | 31 | 34 | 35 | 36.5 | 37.5 |
| 60 min..... | 31 | 30.5 | 32 | 31 | 31.5 | 31 | 33 | 33.5 | 35 | 37.5 |
| 90 min..... | 31 | 30 | 31 | 31 | 30 | 30.5 | 32.5 | 33 | 35.5 | 35 |
| Heat Build-up (Goodrich Flexometer), ΔT, 212° F. | | | | | | | | | | |
| Cure at 307° F., 45 min..... | 55 | — | 60 | — | 62 | — | 57.5 | — | 54 | — |
| 60 min..... | 50 | — | 61 | — | 60 | — | 57.5 | — | 53 | — |
| Abrasion (DuPont), g./hp.-hr. | | | | | | | | | | |
| Cure at 307° F., 45 min..... | 194 | — | 103 | — | 68 | — | 126 | — | 106 | — |
| 60 min..... | 48 | — | 46 | — | 71 | — | 134 | — | 94 | — |
| Flex Cut-Growth (DeMattia) at 180° F. in. per 100 kiloflexes | | | | | | | | | | |
| Cure at 307° F., 45 min..... | 3.6 | 22 | 4.7 | 20 | 2.5 | 17 | 10.5 | 40 | 7.2 | 52 |
| 60 min..... | 6.2 | 20 | 8.4 | 18 | 3.3 | 16 | 8 | 23 | 7.2 | 35 |

* Aged for 48 hours in circulating air oven at 212° F.

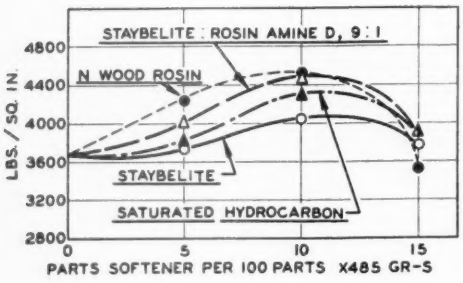


*FIG. 1—Effect on tensile strength.*

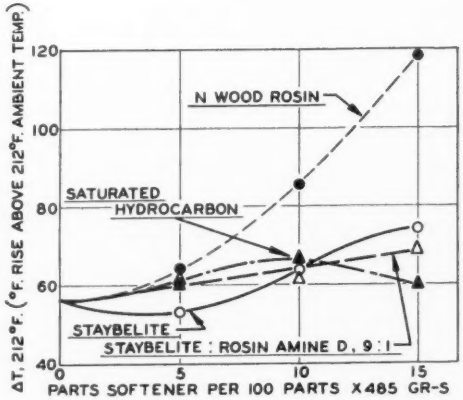


*FIG. 2—Effect on Goodrich Flexometer heat build-up. (Flexometer was operated at 1850 c.p.m., with a stroke of 0.125-inch on a specimen load of 150 p.s.i.)*

**Effect of Softeners on the Channel Black Tread, Formula A, Table I**

TABLE III—CHANNEL BLACK LOADED X-485 GR-S TIRE TREAD CONTAINING 10 PARTS RESINS

| | Using Staybelite | | Using 9 Staybelite—1 Rosin Amine D | | Using N Wood Rosin | | Using Saturated Hydrocarbon Polymer | | Using No Softener | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Unaged | Aged* | Unaged | Aged* | Unaged | Aged* | Unaged | Aged* | Unaged | Aged* |
| Compounded Viscosity (Mooney) "ML" Rotor, 4 min. at 212° F..... | 68.5 | — | 68.5 | — | 69.5 | — | 66 | — | 82 | — |
| Modulus at 200% Elongation, lb./sq. in. | | | | | | | | | | |
| Cure at 307° F., 15 min..... | 75 | 660 | 175 | 1250 | 105 | 725 | 275 | 1185 | 400 | 1860 |
| 30 min..... | 420 | 1315 | 525 | 1540 | 325 | 1020 | 525 | 1345 | 790 | 2185 |
| 60 min..... | 620 | 1515 | 650 | 1400 | 475 | 1035 | 625 | 1100 | 1075 | 2075 |
| 90 min..... | 650 | 1300 | 680 | 1225 | 465 | 975 | 630 | 1000 | 1090 | 1850 |
| Tensile Strength, lb./sq. in. | | | | | | | | | | |
| Cure at 307° F., 15 min..... | 1325 | 3835 | 2565 | 3220 | 1975 | 4055 | 3800 | 2945 | 3810 | 3210 |
| 30 min..... | 3935 | 3195 | 4255 | 3510 | 4180 | 3880 | 4155 | 2925 | 3800 | 2990 |
| 60 min..... | 3905 | 3415 | 4295 | 3460 | 4330 | 3400 | 4125 | 2900 | 3540 | 2775 |
| 90 min..... | 3690 | 2770 | 4020 | 3100 | 3700 | 3115 | 3735 | 3120 | 3280 | 2500 |
| Elongation at Break, % | | | | | | | | | | |
| Cure at 307° F., 15 min..... | 1200 | 665 | 985 | 410 | 1195 | 640 | 890 | 410 | 775 | 310 |
| 30 min..... | 745 | 385 | 695 | 385 | 835 | 560 | 685 | 385 | 505 | 250 |
| 60 min..... | 625 | 390 | 615 | 395 | 720 | 485 | 630 | 410 | 440 | 255 |
| 90 min..... | 580 | 345 | 605 | 385 | 685 | 485 | 605 | 460 | 410 | 255 |
| Hardness (Shore "A") | | | | | | | | | | |
| Cure at 307° F., 15 min..... | 40 | 60 | 45 | 67 | 46 | 63 | 50 | 67 | 55 | 70 |
| 30 min..... | 55 | 67 | 56 | 70 | 56 | 71 | 57 | 70 | 63 | 75 |
| 60 min..... | 58 | 69 | 59 | 69 | 61 | 70 | 58 | 69 | 66 | 74 |
| 90 min..... | 59 | 68 | 60 | 68 | 60 | 71 | 61 | 67 | 65 | 73 |
| Rebound Resilience (Bashore), % | | | | | | | | | | |
| Cure at 307° F., 15 min..... | 32.5 | 31 | 31.5 | 30 | 31 | 30 | 34.5 | 35.5 | 37.5 | 38 |
| 30 min..... | 29.5 | 29 | 29 | 28 | 28 | 29 | 32.5 | 32.5 | 35 | 34 |
| 60 min..... | 28 | 26 | 27 | 26.5 | 27 | 26.5 | 32 | 30.5 | 34.5 | 33 |
| 90 min..... | 28 | 26 | 26.5 | 25.5 | 26 | 26 | 31 | 31 | 33.5 | 34 |
| Heat Build-up (Goodrich Flexometer), ΔT, 212° F. | | | | | | | | | | |
| Cure at 307° F., 45 min..... | 68 | — | 66 | — | 90 | — | 70 | — | 60 | — |
| 60 min..... | 67 | — | 65 | — | 90 | — | 70 | — | 60 | — |
| Abrasion (DuPont), g./hp.-hr. | | | | | | | | | | |
| Cure at 307° F., 45 min..... | 76 | — | 41 | — | 137 | — | 154 | — | 129 | — |
| 60 min..... | 93 | — | 69 | — | 153 | — | 158 | — | 113 | — |
| Flex Cut-Growth (DeMattia) at 180° F. in. per 100 kiloflexes | | | | | | | | | | |
| Cure at 307° F., 45 min..... | 4.5 | 18 | 6.7 | 19 | 1.6 | 10 | 12.4 | 35 | 8.4 | 93 |
| 60 min..... | 4.2 | 17 | 5.2 | 15 | 2.0 | 10 | 9.1 | 33 | 9.9 | 35 |

* Aged for 48 hours in circulating air oven at 212° F.

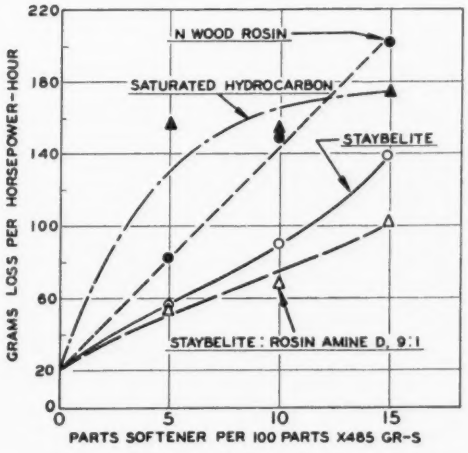


*FIG. 3—Effect on DuPont abrasion resistance.*

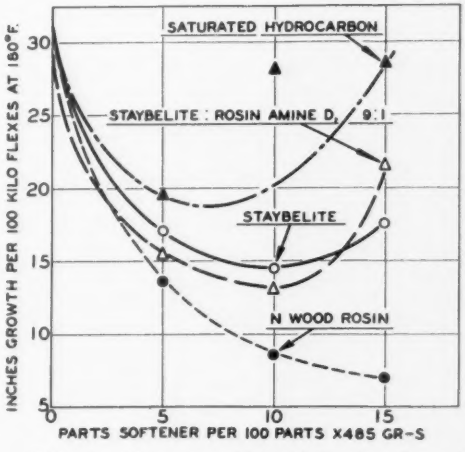


*FIG. 4—Effect on aged DeMattia hot flex cut-growth. (Specimens were aged 48 hours at 212°F. in a circulating air oven.)*

**Effect of Softeners on the Channel Black Tread, Formula A, Table I**

TABLE IV—CHANNEL BLACK LOADED X-485 GR-S TIRE TREAD CONTAINING 15 PARTS RESINS

| | Using Staybelite | | Using 9 Staybelite—1 Rosin Amine D | | Using N Wood Rosin | | Using Saturated Hydrocarbon Polymer | | Using No Softener | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Unaged | Aged* | Unaged | Aged* | Unaged | Aged* | Unaged | Aged* | Unaged | Aged* |
| Compounded Viscosity (Mooney) "ML" Rotor, 4 min. at 212° F. | 54 | — | 55 | — | 56.5 | — | 51.5 | — | 75.5 | — |
| Modulus at 200% Elongation, lb./sq. in. | | | | | | | | | | |
| Cure at 307° F., 15 min. | 90 | 385 | 160 | 860 | 100 | 475 | 210 | 910 | 340 | 1470 |
| 30 min. | 290 | 965 | 375 | 1185 | 210 | 685 | 370 | 1090 | 810 | 2100 |
| 60 min. | 450 | 1100 | 475 | 1110 | 330 | 810 | 435 | 935 | 1010 | 1935 |
| 90 min. | 500 | 1050 | 475 | 1065 | 365 | 765 | 450 | 1140 | 1040 | 1810 |
| Tensile Strength, lb./sq. in. | | | | | | | | | | |
| Cure at 307° F., 15 min. | 1105 | 2580 | 2545 | 4145 | 1390 | 3145 | 3510 | 3000 | 3580 | 2835 |
| 30 min. | 3660 | 3705 | 4020 | 3550 | 3535 | 4055 | 3895 | 3220 | 3865 | 3025 |
| 60 min. | 3595 | 2700 | 3740 | 3205 | 3530 | 3705 | 3825 | 3285 | 3610 | 3020 |
| 90 min. | 3880 | 3220 | 3795 | 3325 | 3505 | 3305 | 3890 | 3560 | 3975 | 3165 |
| Elongation at Break, % | | | | | | | | | | |
| Cure at 307° F., 15 min. | 1265 | 665 | 990 | 575 | 1155 | 675 | 925 | 495 | 800 | 325 |
| 30 min. | 835 | 515 | 725 | 440 | 915 | 645 | 740 | 455 | 545 | 255 |
| 60 min. | 685 | 375 | 645 | 425 | 770 | 595 | 680 | 500 | 450 | 270 |
| 90 min. | 660 | 450 | 635 | 455 | 745 | 575 | 685 | 555 | 455 | 305 |
| Hardness (Shore "A") | | | | | | | | | | |
| Cure at 307° F., 15 min. | 38 | 55 | 44 | 63 | 36 | 56 | 48 | 65 | 52 | 71 |
| 30 min. | 49 | 65 | 54 | 65 | 50 | 62 | 54 | 67 | 62 | 75 |
| 60 min. | 56 | 67 | 56 | 65 | 54 | 65 | 56 | 66 | 64 | 73 |
| 90 min. | 56 | 67 | 56 | 66 | 55 | 66 | 55 | 63 | 66 | 73 |
| Rebound Resilience (Bashore), % | | | | | | | | | | |
| Cure at 307° F., 15 min. | 31.5 | 30.5 | 29 | 28 | 31 | 29.5 | 33 | 35 | 38 | 38.5 |
| 30 min. | 28 | 26.5 | 27 | 26 | 27.5 | 27 | 33 | 32 | 36.5 | 37 |
| 60 min. | 25.5 | 24.5 | 25.5 | 24 | 26.5 | 25.5 | 32 | 29.5 | 35 | 35.5 |
| 90 min. | 25.5 | 24.5 | 25.5 | 23.5 | 26 | 25 | 31 | 29.5 | 34.5 | 35 |
| Heat Build-up (Goodrich Flexometer), $\Delta T$, 212° F. | | | | | | | | | | |
| Cure at 307° F., 45 min. | 86 | — | 74 | — | Blew out 22 min. | — | 67 | — | 56 | — |
| 60 min. | 74 | — | 69 | — | 119 | — | 59.5 | — | 57 | — |
| Abrasion (DuPont), g./hp.-hr. | | | | | | | | | | |
| Cure at 307° F., 45 min. | 183 | — | 145 | — | 251 | — | 232 | — | 121 | — |
| 60 min. | 154 | — | 112 | — | 224 | — | 194 | — | 122 | — |
| Flex Cut-Growth (DeMattia) at 180° F. in. per 100 kiloflexes | | | | | | | | | | |
| Cure at 307° F., 45 min. | 2.2 | 14 | 3.7 | 16 | 1.2 | 5 | 10.1 | 33 | 8.4 | 37 |
| 60 min. | 2.7 | 13 | 4.5 | 16 | 1.7 | 5 | 10.3 | 21 | 8.3 | 23 |

* Aged for 48 hours in circulating air oven at 212° F.

ically the effect of Staybelite, the 9:1 blend of Staybelite with Rosin Amine D, N wood rosin, and Para Flux, on tensile strength, heat build-up, abrasion rate and aged hot flex cut-growth. The unsoftened value shown on the graphs is the average of the three controls used with the 5, 10, and 15 part resin levels. The individual values are the products of the individual observations and the ratios of the individual controls to the averaged controls. Data on the longer of the two cures near the optimum (60 minutes) were used.

Staybelite was found, in the uncured channel black loaded X-485 GR-S tread stock, to be slightly more active as a softener than wood rosin. However, the differences amounted to not more than three or four Mooney units. At all three levels, the ease of incorporation was the same for all the softeners; however, the rosin derivatives were superior to the aliphatic hydrocarbon polymer in building tack.

In two of the critical tread properties, heat build-up and abrasion resistance, Staybelite was superior to ordinary rosin, and superior to the hydrocarbon in abrasion resistance. Heat build-up values for the Staybelite and wood rosin stocks, respectively, cured 60 minutes at 307°F. at 5- 10- and 15-part levels and were 50 and 60, 67 and 90, 74 and 119 degrees F. rise above the ambient temperatures of 212°F. The rate of abrasion followed a similar pattern. At the 5-part level, comparative figures were 48 and 71 grams per horsepower-hour, with Staybelite and wood rosin, respectively, as the softeners; 10 parts of the resin gave abrasion values of 93 and 153, and 15 parts gave values of 154 and 224 grams per horsepower-hour. The corresponding values for 5, 10, and 15 parts polymerized hydrocarbon were 134, 158, and 194 grams per horsepower-hour.

The rate of hot flex cracking both before and after aging was entirely satisfactory, with both wood rosin and Staybelite resin values being substantially superior to the unsoftened control and to that of the specimens containing the polymerized hydrocarbon.

In the formula selected for these tests, Staybelite and wood rosin did not appear to retard the rate of cure to the extent that they had in earlier work with conventional GR-S. It is believed that the higher vulcanization temperature and relatively higher sulfur level in the present study rather than a different reaction of resin acids with cold rubber accounts for these results.

It was found that introduction of Rosin Amine D gave faster rate of vulcanization and some improvement in

TABLE V—FURNACE BLACK LOADED X-485 GR-S TIRE TREAD CONTAINING 5 PARTS RESINS

| | Using Staybelite | | Using 9 Staybelite—1 Rosin Amine D | | Using N Wood Rosin | | Using Saturated Hydrocarbon Polymer | | Using No Softener | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Unaged | Aged* | Unaged | Aged* | Unaged | Aged* | Unaged | Aged* | Unaged | Aged* |
| Compounded Viscosity (Mooney) "ML" Rotor, 4 min. at 212° F. | 70 | — | 70.5 | — | 71.5 | — | 68.5 | — | 77.5 | — |
| Modulus at 200% Elongation, lb./sq. in. | | | | | | | | | | |
| Cure at 307° F., 20 min. | 365 | 1750 | 525 | 2075 | 390 | 1590 | 580 | 2060 | 785 | 2710 |
| 30 min. | 590 | 1920 | 735 | 2015 | 515 | 1760 | 740 | 1875 | 980 | 2560 |
| 45 min. | 750 | 1935 | 840 | 1940 | 700 | 1610 | 800 | 1740 | 1060 | 2310 |
| 60 min. | 860 | 1675 | 860 | 1760 | 775 | 1515 | 740 | 1580 | 1040 | 2160 |
| Tensile Strength, lb./sq. in. | | | | | | | | | | |
| Cure at 307° F., 20 min. | 3015 | 3700 | 3445 | 3630 | 3020 | 3865 | 3685 | 3590 | 3755 | 3530 |
| 30 min. | 3655 | 3885 | 3660 | 3740 | 3690 | 3635 | 3965 | 3350 | 3900 | 3480 |
| 45 min. | 3865 | 3870 | 4080 | 3720 | 3765 | 3655 | 3815 | 3380 | 4005 | 3305 |
| 60 min. | 3860 | 3605 | 4115 | 3690 | 3820 | 3575 | 3875 | 3580 | 4055 | 3425 |
| Elongation at Break, % | | | | | | | | | | |
| Cure at 307° F., 20 min. | 735 | 345 | 665 | 305 | 750 | 385 | 665 | 315 | 555 | 250 |
| 30 min. | 625 | 330 | 560 | 315 | 695 | 350 | 610 | 310 | 490 | 255 |
| 45 min. | 565 | 325 | 545 | 325 | 600 | 360 | 555 | 335 | 460 | 260 |
| 60 min. | 525 | 340 | 535 | 340 | 570 | 365 | 565 | 375 | 455 | 280 |
| Hardness (Shore "A") | | | | | | | | | | |
| Cure at 307° F., 20 min. | 48 | 64 | 51 | 65 | 48 | 64 | 52 | 67 | 55 | 68 |
| 30 min. | 52 | 66 | 54 | 66 | 52 | 65 | 55 | 66 | 58 | 68 |
| 45 min. | 55 | 66 | 55 | 66 | 54 | 65 | 55 | 65 | 58 | 67 |
| 60 min. | 55 | 63 | 55 | 63 | 55 | 62 | 55 | 64 | 59 | 67 |
| Rebound Resilience (Bashore), % | | | | | | | | | | |
| Cure at 307° F., 20 min. | 38 | 36.5 | 37.5 | 36 | 37.5 | 36 | 38 | 38.5 | 39.5 | 40.5 |
| 30 min. | 36.5 | 34.5 | 36.5 | 34.5 | 37 | 35.5 | 38 | 37.5 | 39.5 | 39.5 |
| 45 min. | 36 | 34.5 | 36 | 34 | 36 | 34.5 | 38 | 37 | 39 | 39 |
| 60 min. | 35 | 33.5 | 35.5 | 34 | 35 | 34.5 | 38 | 37 | 39 | 38.5 |
| Heat Build-up (Goodrich Flexometer), ΔT, 212° F. | | | | | | | | | | |
| Cure at 307° F., 30 min. | — | — | 78.1 | — | — | — | 71 | — | 60 | — |
| 45 min. | 65.7 | — | 53 | — | 83 | — | 63 | — | 56 | — |
| 60 min. | 59.0 | — | — | — | 68 | — | — | — | — | — |
| Abrasion (DuPont), g./hp.-hr. | | | | | | | | | | |
| Cure at 307° F., 30 min. | — | — | 28 | — | — | — | 36 | — | 26 | — |
| 45 min. | 16.1 | — | 19 | — | 24 | — | 35 | — | 21 | — |
| 60 min. | 24.2 | — | — | — | 20 | — | — | — | — | — |
| Flex Cut-Growth (DeMattia) at 180° F. in. per 100 kiloflexes | | | | | | | | | | |
| Cure at 307° F., 30 min. | — | — | 0.86 | 19.3 | — | — | 0.62 | 25 | 0.93 | 46 |
| 45 min. | 0.87 | 15.4 | 0.8 | 12.4 | 0.43 | 7.4 | 0.75 | 15 | 1.2 | 23 |
| 60 min. | 0.93 | 7.4 | — | — | 0.68 | 4.4 | — | — | — | — |

* Aged for 96 hours in circulating air oven at 212° F.

unaged tensile strength and unaged abrasion resistance over Staybelite itself, while maintaining the other properties measured. The increase in tensile strength amounted to about 200 p.s.i. (over 3950 p.s.i.). The improvement in abrasion resistance became greater as the resin was increased, amounting to about 2 grams per horsepower-hour at 5 parts loading to 35 grams at the 15-part softener level.

## Results with Furnace Black

Tables V, VI and VII and Figures 5, 6, 7 and 8 contain data resulting from tests made on furnace black-loaded stocks (Table I, Formula B). As to the channel black compound already discussed, the three resins (Staybelite, 9:1 Staybelite-Rosin Amine D blend, and N wood rosin) and the hydrocarbon polymer (Para Flux) were each added to the basic formula to the extent of 5, 10, and 15 parts per 100 parts of X-485 GR-S. Like in the channel black series, a masterbatch of the basic formula was prepared for each level of softener, and the softeners added to aliquot portions of it; a fifth portion was tested as the unsoftened control.

Essentially the same changes in the properties of the unsoftened furnace black control were brought about by additions of the four softeners as were introduced by them into the channel black stocks. Staybelite offered better heat build-up and abrasion resistance than wood rosin, with improved abrasion over the hydrocarbon, and at the same time Staybelite maintained the other physical properties, both before and after aging, to a satisfactory degree.

The amount of advantage of Staybelite over wood rosin, and in turn that of the Staybelite-Rosin Amine D blend over Staybelite, was found to be somewhat less with furnace black than when channel black was the loading material. It is possible that this difference results from the superior properties of the cold rubber-furnace black combination itself. The vulcanizates were so resistant to air-oven aging that it was necessary to increase the aging period from the usual 48 hours to 96 hours to cause measurable degradation of the initial properties.

It is interesting that the furnace black treads containing 10 parts of Staybelite-Rosin Amine D blend had very low hot flex cut-growth rates in addition to satisfactory heat build-up and abrasion resistance. The rates for unaged specimens were 0.5 to 0.8 inch per 100,000

TABLE VI—FURNACE BLACK LOADED X-485 GR-S TIRE TREAD CONTAINING 10 PARTS RESINS

| | Using Staybelite | | Using 9 Staybelite—1 Rosin Amine D | | Using N Wood Rosin | | Using Saturated Hydrocarbon Polymer | | Using No Softener | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Unaged | Aged* | Unaged | Aged* | Unaged | Aged* | Unaged | Aged* | Unaged | Aged* |
| Compounded Viscosity (Mooney) "ML" Rotor, 4 min. at 212° F. | 60 | — | 59.5 | — | 61.5 | — | 58 | — | 75 | — |
| Modulus at 200% Elongation, lb./sq. in. | | | | | | | | | | |
| Cure at 307° F., 20 min. | 235 | 1200 | 335 | 1630 | 165 | 1035 | 400 | 1625 | 710 | 2550 |
| 30 min. | 370 | 1430 | 490 | 1715 | 320 | 1210 | 540 | 1650 | 925 | 2660 |
| 45 min. | 485 | 1490 | 610 | 1570 | 425 | 1170 | 560 | 1610 | 1085 | 2315 |
| 60 min. | 600 | 1440 | 665 | 1465 | 480 | 1170 | 580 | 1200 | 1090 | 2160 |
| Tensile Strength, lb./sq. in. | | | | | | | | | | |
| Cure at 307° F., 20 min. | 1955 | 3715 | 3005 | 3105 | 1760 | 3915 | 3220 | 3360 | 3780 | 3525 |
| 30 min. | 3175 | 3870 | 3765 | 3790 | 3060 | 3995 | 3505 | 3350 | 4085 | 3425 |
| 45 min. | 3660 | 3715 | 3960 | 3885 | 3485 | 3840 | 3625 | 3285 | 4205 | 3760 |
| 60 min. | 3985 | 3855 | 4145 | 3950 | 3585 | 3950 | 3880 | 3365 | 4120 | 3405 |
| Elongation at Break, % | | | | | | | | | | |
| Cure at 307° F., 20 min. | 915 | 435 | 815 | 395 | 915 | 520 | 755 | 365 | 605 | 255 |
| 30 min. | 770 | 400 | 700 | 350 | 820 | 480 | 675 | 375 | 520 | 245 |
| 45 min. | 685 | 375 | 635 | 370 | 740 | 450 | 645 | 405 | 485 | 285 |
| 60 min. | 665 | 395 | 620 | 400 | 695 | 465 | 665 | 435 | 475 | 280 |
| Hardness (Shore "A") | | | | | | | | | | |
| Cure at 307° F., 20 min. | 42 | 58 | 43 | 61 | 40 | 59 | 48 | 65 | 55 | 68 |
| 30 min. | 45 | 60 | 48 | 60 | 46 | 60 | 51 | 64 | 57 | 70 |
| 45 min. | 47 | 61 | 50 | 60 | 48 | 60 | 51 | 62 | 59 | 68 |
| 60 min. | 50 | 61 | 50 | 60 | 50 | 61 | 53 | 62 | 60 | 68 |
| Rebound Resilience (Bashore), % | | | | | | | | | | |
| Cure at 307° F., 20 min. | 35 | 33 | 34 | 32 | 35 | 33.5 | 37 | 36.5 | 40 | 39.5 |
| 30 min. | 33.5 | 32 | 33 | 31.5 | 33.5 | 31.5 | 36.5 | 35 | 39 | 38.5 |
| 45 min. | 32.5 | 31 | 33 | 30.5 | 33 | 31.5 | 36.5 | 35 | 39 | 38 |
| 60 min. | 32.5 | 30.5 | 33 | 30 | 32.5 | 30.5 | 36.5 | 35 | 39 | 38 |
| Heat Build-up (Goodrich Flexometer), ΔT, 212° F | | | | | | | | | | |
| Cure at 307° F., 30 min. | — | — | 110 | — | — | — | 112 | — | 71 | — |
| 45 min. | 86.3 | — | 66 | — | Blew out | — | 91 | — | 66 | — |
| 60 min. | 81.4 | — | — | — | Blew out | — | — | — | — | — |
| Abrasion (DuPont), g./hp.-hr. | | | | | | | | | | |
| Cure at 307° F., 30 min. | — | — | 20 | — | — | — | 32 | — | 21 | — |
| 45 min. | 18.3 | — | 22 | — | 34 | — | 26 | — | 19 | — |
| 60 min. | 18.6 | — | — | — | 24 | — | — | — | — | — |
| Flex Cut-Growth (DeMattia) at 180° F. in. per 100 kiloflexes | | | | | | | | | | |
| Cure at 307° F., 30 min. | — | — | 0.41 | 12 | — | — | 0.33 | 20 | 0.66 | 56 |
| 45 min. | 0.58 | 9.9 | 0.50 | 7.9 | 0.16 | 2.5 | 0.50 | 11 | 0.58 | 18 |
| 60 min. | 0.58 | 6.7 | — | — | 0.16 | 2.0 | — | — | — | — |

* Aged for 96 hours in circulating air oven at 212° F.

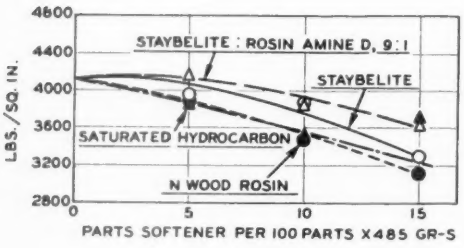


*FIG. 5—Effect on tensile strength.*

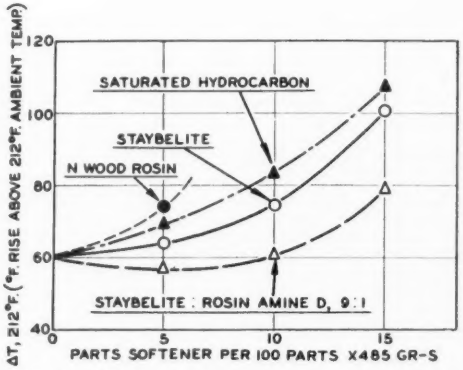


*FIG. 6—Effect on Goodrich Flexometer heat build-up. (Flexometer was operated at 1850 c.p.m., with a stroke of 0.125-inch on a specimen load of 150 p.s.i.)*

**Effect of Softeners on the Furnace Black Tread, Formula B, Table I**

TABLE VII—FURNACE BLACK LOADED X-485 GR-S TIRE TREAD CONTAINING 15 PARTS RESINS

| | Using Staybelite | | Using 9 Staybelite—1 Rosin Amine D | | Using N Wood Rosin | | Using Saturated Hydrocarbon Polymer | | Using No Softener | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Unaged | Aged* | Unaged | Aged* | Unaged | Aged* | Unaged | Aged* | Unaged | Aged* |
| Compounded Viscosity (Mooney) "ML" Rotor, 4 min. at 212° F. | 58 | — | 56.5 | — | 58.5 | — | 53.5 | — | 76.5 | — |
| Modulus at 200% Elongation, lb./sq. in. | | | | | | | | | | |
| Cure at 307° F., 20 min. | 280 | 975 | 310 | 1445 | 170 | 825 | 305 | 1260 | 810 | 2585 |
| 30 min. | 310 | 1190 | 450 | 1375 | 265 | 850 | 425 | 1200 | 1035 | 2590 |
| 45 min. | 360 | 1210 | 510 | 1365 | 310 | 825 | 490 | 1075 | 1105 | 2340 |
| 60 min. | 410 | 1105 | 570 | 1265 | 340 | 870 | 485 | 950 | 1200 | 2050 |
| Tensile Strength, lb./sq. in. | | | | | | | | | | |
| Cure at 307° F., 20 min. | 1560 | 4040 | 3080 | 4115 | 1715 | 3965 | 3095 | 3265 | 3735 | 3545 |
| 30 min. | 2635 | 4135 | 3635 | 4175 | 2700 | 3720 | 3485 | 3260 | 4120 | 3685 |
| 45 min. | 3335 | 3900 | 3825 | 3970 | 3115 | 3725 | 3680 | 3120 | 3960 | 3740 |
| 60 min. | 3285 | 3315 | 3800 | 3815 | 3120 | 3340 | 3485 | 3235 | 4025 | 3545 |
| Elongation at Break, % | | | | | | | | | | |
| Cure at 307° F., 20 min. | 1000 | 580 | 845 | 455 | 1050 | 645 | 790 | 435 | 580 | 250 |
| 30 min. | 830 | 530 | 760 | 450 | 920 | 620 | 760 | 445 | 515 | 265 |
| 45 min. | 790 | 480 | 705 | 445 | 840 | 590 | 740 | 455 | 475 | 290 |
| 60 min. | 695 | 440 | 685 | 460 | 785 | 560 | 720 | 520 | 435 | 290 |
| Hardness (Shore "A") | | | | | | | | | | |
| Cure at 307° F., 20 min. | 40 | 58 | 44 | 60 | 42 | 57 | 45 | 59 | 55 | 67 |
| 30 min. | 45 | 57 | 47 | 59 | 45 | 59 | 48 | 61 | 57 | 68 |
| 45 min. | 47 | 60 | 47 | 59 | 47 | 58 | 49 | 59 | 59 | 67 |
| 60 min. | 49 | 58 | 49 | 59 | 49 | 58 | 49 | 56 | 60 | 66 |
| Rebound Resilience (Bashore), % | | | | | | | | | | |
| Cure at 307° F., 20 min. | 33 | 31.5 | 31.5 | 28.5 | 32.5 | 30.5 | 39 | 37 | 42 | 41.5 |
| 30 min. | 32 | 29.5 | 31.5 | 28.5 | 32.5 | 29.5 | 38 | 37 | 41 | 41 |
| 45 min. | 32 | 29.5 | 30.5 | 28 | 31.5 | 29 | 38 | 36 | 41 | 40 |
| 60 min. | 31.5 | 28 | 30 | 28 | 31 | 29 | 37 | 36 | 40 | 40 |
| Heat Build-up (Goodrich Flexometer), ΔT, 212° F. | | | | | | | | | | |
| Cure at 307° F., 30 min. | — | — | 121 | — | — | — | Blew out | — | 69 | — |
| 45 min. | Blew out | — | 79 | — | Blew out | — | 108 | — | 61 | — |
| 60 min. | 101 | — | — | — | Blew out | — | — | — | — | — |
| Abrasion (DuPont), g./hp.-hr. | | | | | | | | | | |
| Cure at 307° F., 30 min. | — | — | 48 | — | — | — | 151 | — | 23 | — |
| 45 min. | 30 | — | 26 | — | 51 | — | 144 | — | 25 | — |
| 60 min. | 62 | — | — | — | 76 | — | — | — | — | — |
| Flex Cut-Growth (DeMattia) at 180° F. in. per 100 kiloflexes | | | | | | | | | | |
| Cure at 307° F., 30 min. | — | — | 0.28 | 5.9 | — | — | 0.35 | 14 | 0.85 | 26 |
| 45 min. | 0.28 | 3.0 | 0.49 | 3.9 | 0.14 | 1.5 | 0.50 | 8 | 0.85 | 20 |
| 60 min. | 0.35 | 3.0 | — | — | 0.14 | 1.0 | — | — | — | — |

* Aged for 96 hours in circulating air oven at 212° F.

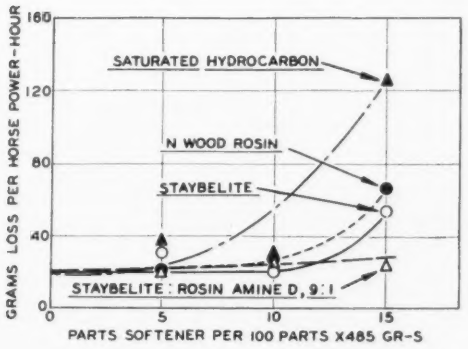


*FIG. 7—Effect on DuPont abrasion resistance.*

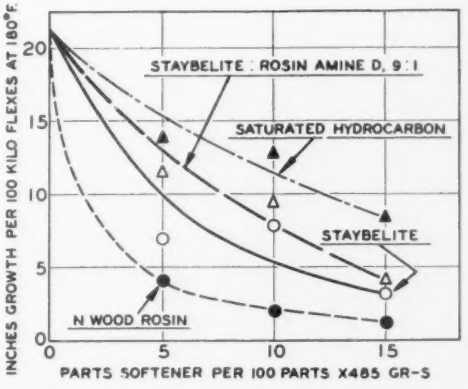


*FIG. 8—Effect on aged DeMattia flex cut-growth. (Specimens were aged 96 hours at 212°F. in a circulating air oven.)*

**Effect of Softeners on the Furnace Black Tread, Formula B, Table I**

flexes; after 96 hours' aging at 212°F. the rate had risen only to 6 to 12 inches. These rates of cut-growth were superior to those containing the hydrocarbon-type softener, and quite closely approached values to be expected from good quality natural rubber tread. They were also better than those obtained with channel black-cold rubber compositions (Tables II, III and IV and Figures 1, 2, 3 and 4) and much superior to conventional GR-S-channel black rates *(2)*.

## Tests on Scorch Resistance

Staybelite has been used as a scorch retarder, and in view of the general feeling that cold rubber, particularly in combination with furnace blacks, yields compounds which have a strong tendency to scorch, tests were made to determine the effect of Staybelite on the test furnace black stock.

Using Formula B (Table I), batches were prepared on the 6 by 12-inch laboratory mill with the rolls cooled to about 140°F.; mixes were also made in a laboratory Banbury operated at high speed in order to simulate the fast, high-temperature compounding sometimes encountered in factory practice. Stocks were discharged from the Banbury mixer at 290-300°F., followed by cool mill addition of sulfur. Stocks containing 10 parts each Staybelite and the 9:1 blend of Staybelite and Rosin Amine D were compared with an unsoftened control. The data obtained are shown in Table VIII.

Repeated cool laboratory mill runs on two lots of X-485 GR-S and two lots of accelerator did not bring out any indication of a tendency of cold rubber and furnace black to be scorchy in the unsoftened test formula. However, the tests did show that 10 parts Staybelite introduces a desirable induction period at 250°F., increasing the time before vulcanization was initiated from 52.5 minutes to 87 minutes. Even when 1 part Rosin Amine D was blended with 9 parts Staybelite the scorch-inhibiting power was retained; the time to start cure still was increased to 63.5 minutes. Banbury mixing of all materials except sulfur at a front rotor speed of 115 r.p.m. and a compounding cycle covering 10.5 minutes gave batches with discharge temperatures of 290-300°F. When sulfur was added to these mixes, the scorch properties were, as shown in Table VIII, essentially identical with those mixed on the cool laboratory mill.

To study further the effect of Staybelite on scorch resistance, the mill-compounded stocks of Table VIII also were subjected to tests with the Mooney viscometer platens controlled at 275°F., 330°F., and 340°F. The data thus obtained are recorded in Table IX. The data

TABLE VIII—MOONEY SCORCH OF FURNACE BLACK LOADED X-485 GR-S TIRE TREAD—COOL MILL VS. HOT BANBURY MIXING

| | Minutes to Five-Point Rise, "MS" (1.1875-inch) Rotor, 250° F. | | |
|---|---|---|---|
| | Using Staybelite Ten Parts | Using Staybelite Nine Parts—Rosin Amine D One Part | Using No Softener |
| Cool Mill Mixed | 87 | 63.5 | 52.5 |
| Hot Banbury Mixed* | 84 | 62.5 | 49.0 |
| Banbury Mix Discharge Temperature | 290° F. | 290° F. | 300° F. |

* Sulfur added on cool rolls.

TABLE IX—EFFECT OF STAYBELITE AND STAYBELITE-ROSIN AMINE D BLEND ON MOONEY SCORCH OF FURNACE BLACK LOADED X-485 GR-S TREAD AT VARIOUS TEMPERATURES

| Mooney Platen Temperature, °F. | Minutes to Five-Point Rise "MS" (1.1875-inch) Rotor Using Staybelite | | |
|---|---|---|---|
| | Using Staybelite Ten Parts | Using Staybelite Nine Parts—Rosin Amine D One Part | Using No Softener |
| 250 | 87.0 | 63.5 | 52.5 |
| 275 | 33.5 | 27.5 | 21.0 |
| 330 | 7.0 | 6.5 | 5.5 |
| 340 | 5.0 | 4.5 | 4.0 |

demonstrate that the strong inhibiting action of Staybelite and the more moderate effect of the 9:1 blend with Rosin Amine D are rapidly reduced as the temperature approaches 300°F. At 340°F., the furnace black tread with 10 parts Staybelite began to cure in 5 minutes, compared to 4 minutes for the unsoftened control; these almost equal values were separated to 87 and 52.5 minutes, respectively, at 250°F. The 9:1 blend had an induction period of 4.5 minutes at the high temperature, and also was intermediate at 275°F. and at 350°F.

These scorch data at variable temperatures indicate that to make the most of the ability of Staybelite to give safe processing compounds, cure temperatures should be as high as is practical; at the same time, the small amount of extra time required to begin set-up with Staybelite as the softener should be helpful in preventing scorch in plant extruder operations where the stocks may be subjected to quite high temperatures for short periods of time.

## Experimental Data

For vulcanizate evaluation, masterbatches were prepared to contain all materials except the softening resin. Separate masterbatches were prepared for each resin level (i.e., 5, 10, and 15 parts per 100 parts X-485 GR-S), and portions of each were subjected to tests along with the softened portions. Both the masterbatches and subsequent individual compounds were mixed on 6 by 12-inch rolls, starting at about 120°F. with cold water passing through the rolls.

Mooney viscosity was determined at 212°F. with the large "ML" rotor, reading the shaft deflection after 4 minutes. Scorch tests were made with the same instrument, using the "MS" rotor at 250°F., with a special set of runs made at higher temperatures.

Tensile tests were run at 77°F. and 50% R.H. on 0.075-inch thick A.S.T.M. "Die C" specimens using a Scott L-6 tensile tester; hardness was determined with a Shore "A" Durometer and resilience with a Bashore resiliometer, under the same conditions as the tensile tests. Specimens were die-cut from the same cured sheet for tests both on unaged compounds and after aging in a circulating air oven. Both the channel and the furnace black stocks were aged at 212°F., the former for 48 hours and the latter for 96 hours.

The rest of the tests were made on specimens cured for two periods close to the optimum state of cure. The optimum was determined as the average time at which the tensile properties, hardness, and resilience either reached a maximum or leveled off *(2)*.

Rate of flex cut-growth was determined at 185°F. by use of the DeMattia flexing machine as described in A.S.T.M. D 813-44T, and heat build-up was tested

through use of the Goodrich flexometer (A.S.T.M. D 623-41T).

Abrasion resistance was determined at room temperature, using the DuPont abrader to test unextracted specimens (A.S.T.M. D 394-47). There was no visual evidence that the abrasive surface was lubricated by any materials contained in the vulcanizates; therefore it is believed that the more direct information obtained in this manner is more useful than that which would be obtained by testing solvent-extracted specimens. The latter method has been proposed as a means of overcoming the tendency of some compositions to fill the abrasive surface *(5)*, reducing its effectiveness and thereby yielding too high abrasion resistance values.

Special Banbury runs to determine the effect of high-temperature compounding on scorch were run by adjusting the front rotor speed of the 1250-gram laboratory Banbury mixer to the relatively high rate of 115 r.p.m., and compounding by the usual procedure, except that only enough water was passed through the rotors and sides to allow a batch temperature at discharge of about 300°F. The batches were prepared without sulfur; after they were allowed to cool, the vulcanizing agent was added on the cool 6 by 12-inch two-roll mill.

The materials used in this investigation are identified as follows:

X-485 GR-S: General-purpose butadiene-styrene copolymer emulsified with a Dresinate, polymerized at 41° F.
Micronex W-6 Beads: EPC (easy processing channel) carbon black, Binney and Smith Co.
Philblack O: HAF (high abrasion furnace) carbon black, Phillips Petroleum Co.
Santocure: N-Cyclohexyl-2-benzothiazyl sulfenamide, Monsanto Chemical Co.
XX4 Zinc Oxide: New Jersey Zinc Sales Co.
Stearex Beads: Stearic acid, Binney and Smith Co.
Age-Rite Powder: Phenyl-β-naphthylamine, R. T. Vanderbilt Co.
Tube Brand Sulfur: Stauffer Chemical Co.
Staybelite: Stabilized resin acids, Hercules Powder Co.
Rosin Amine D: An amine derived from disproportionated rosin; predominantly dehydroabietylamine, Hercules Powder Co.
N Wood Rosin: Refined wood rosin, Hercules Powder Co.
Para Flux: Saturated polymerized hydrocarbon, C. P. Hall Co.

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(3) Amberg, L. O., *Ind. Eng. Chem.*, Vol. 40, No. 4, p. 487 (March, 1948).
(4) U. S. Patent No. 2,491,913.
(5) Griffith, T. R., Storey, E. B., Barkley, J. W. D., and McGilvray, F. M., *Analytical Chemistry*, Vol. 20, p. 837 (September, 1948).


## Additional Reports of Avoidable Accidents In Rubber Factories

ADDITIONAL reports of avoidable accidents, taken from the Safety Newsletter issued by the Rubber Section of the National Safety Council, follow herewith:

*Static Results in Burns:* A worker was preparing a batch of cement from scrap film and benzene. About 200 gallons of benzene plus 650 pounds of freshly cut scrap had been added to the neutralizer. The agitator was running. The worker was standing on the neutralizer platform about 3 feet from the manhole. A static spark that was generated from the agitator running in the dry film occurred at a place inside the neutralizer where there was enough air combined with benzene vapors to produce an explosive mixture. This mixture flashed, and the flame that came out of the manhole burned the worker. He was immediately taken to the hospital.

In the future, low plasticized scrap will be permitted to stand for a day or two to dissipate its static. It will also be fed at a slower rate to enable it to work into the benzene solution before more dry scrap is added. In addition, operators have been instructed not to spend any more time than is absolutely necessary in looking into the neutralizer manholes and are to continue to keep the lids closed as much as possible.

*Mill Operation:* An operator claimed that he had removed the batch of stock from an apron mill in the usual and instructed manner. He said that he noticed pieces of metal riding between the rolls after the batch was removed, and instead of notifying his supervisor or shutting the line down by tripping the safety, he decided to try to remove the pieces of metal with his fingers. In doing so, the tips of the first three fingers of his right hand were caught between the rolls. Instead of pulling the safety immediately, he pulled his hand back out as quickly as he could, but the first joints of the middle three fingers were amputated. All operators have been instructed that in no case is any foreign material to be removed from rolls while lines are in operation.

*Overloaded Truck:* An employee in the curing room of a rubber plant suffered several broken ribs and will lose approximately seven to ten days' work. This employee was moving two 11 x 24 molds having a combined weight of 6,000 lbs. on a hydraulic lift hand truck. The truck was adjusted in a raised position and locked, then the molds were placed on the truck by a hoist. When this employee attempted to release the safety catch to lower the molds, he was unable to do so. In an attempt to relieve the excessive weight, he engaged the handle of the truck in the lifting mechanism and sat on the handle while releasing the safety catch. When the catch released, the weight of the molds forced the handle upward so that it struck the employee in the ribs, causing the fracture.

The contributing cause of this accident was the fact that the truck was heavily loaded. It is rated at a maximum of 3,000 lbs., although 6,000 lbs. were being handled.

*Rubber Knife Dangerous:* An employee was injured while sharpening a rubber knife by pushing and pulling it across an emery stone. As he was pulling the knife towards him, his hand slipped and the sharp edge of the blade lacerated the first finger on his left hand. The employee received treatment at the hospital and returned to work. No lost time was involved. Of his own volition and accord, he was performing work with which he was unfamiliar. All knives in this department are sharpened by a man assigned to this job. Men have been cautioned by supervision about doing work of this nature.

# Rubber Chemistry Division of C. I. C. to Hold Meeting in Kitchener, Ont., on June 15

THE Rubber Chemistry Division of the Chemical Institute of Canada has scheduled a number of interesting papers to be presented at the Regional Conference to be held at the Walper House in Kitchener, Ontario, Canada on Friday, June 15. J. T. Black, of the Polymer Corp., Ltd., Sarnia, Ontario, is chairman of the Division. The Division has planned a banquet for the evening of June 15 at which William O'Neil, president of the General Tire & Rubber Co., will speak. Abstracts of the papers to be presented at the conference follow:

## ABSTRACTS OF PAPERS

**9:30-10:00 A.M.—Quality Control at No Cost for the Rubber Industry.** ***Gaston Fournier (Acton Rubber Co., Ltd., Acton Vale, Quebec).***

In this paper an attempt is made to define quality control and to demonstrate that applications of quality-control do not have to be complicated and costly to be effective. It shows how simple control charts are used to segregate important information from the huge quantity of data that appear on most production control reports. A description of a "Digest Report" which is prepared for the busy executive and which summarizes all the reports on quality and scrap into one simple report is given. Two typical production control reports are analyzed to illustrate the part played by the control chart in the preparation of the "Digest Report". The two reports selected for analysis are: the "daily damaged and defective" report and the "calender running book". Some of the outstanding results obtained with control charts are also given. Since all the applications described in this paper involve only a change in the presentation of data which requires no more clerical work than older methods it is concluded that quality control principles can be applied at no cost to our industry.

**10:00-10:30 A.M.—Hard Rubber.** ***E. D. Jackson (Joseph Stokes Rubber Co., Welland, Ont.).***

Natural rubber, the Buna S rubbers and the Buna N rubbers, and the products obtained by reclaiming the soft vulcanizates of these materials, may be vulcanized with fairly large amounts of sulfur to produce hard rigid materials. The choice of what material is to be used to produce a specific product depends upon the process to be used and upon the characteristics required in the product. Hard rubber articles may be produced in a number of ways, by machining from sheets, rods, or tubes, by building on a metal form and vulcanizing in open steam, and by molding.

The characteristics of hard rubber materials may be defined in terms of tensile strength, elongation, hardness, impact strength, cold flow, heat distortion at elevated temperatures, electrical properties, flexural strength and resistance to attack by chemicals. Natural rubber is most suitable for built-up hard rubber products; Buna S has very definite advantages in molded products; Buna N rubbers produce products with great resistance to heat softening, and reclaimed rubber is useful in reducing costs where the characteristics required in the product will permit its use.

**10:30-11:00 A. M.—Mid-Century Survey of Rubber Carbons.** ***H. A. Braendle (Columbian Carbon Co., New York, N. Y.).***

The marriage of carbon black and rubber has recently had its 40th anniversary. For 30 years both the carbon and rubber industries were content to accept the benefits of this union. The past 10 years have brought forth new offspring. Some of the recent discoveries throwing light on the ever-strengthening ties of this marriage are reviewed in this paper.

**11:00-11:30 A.M.—White Carbon Black—What is It?** ***V. H. Vodra (Wyandotte Chemical Co., Wyandotte, Mich.).***

A progress report in the search for "white carbon black" is made. Black carbon black properties are discussed and compared with many non-black fillers. Non-black fillers are not alike and each should be considered separately when formulating or processing. Evidence is offered that far greater differences exist between the extremes of one group of non-black fillers than exist between the extremes of all rubber carbon blacks. Thus, merely evaluating one member will not establish entire values for the group as a whole.

Electron photomicrographs of 28 common rubber fillers are offered to illustrate similarity and differences in particle shapes and sizes. The effect of particle size on quality is shown for both natural and GR-S rubbers. Since physical properties are greatly dependent upon particle size and surface area, it is possible to predict results by studies of chemical analyses and electron pictures.

Practical compounding suggestions and demonstrations are offered to take advantage of the best qualities of some non-black fillers to improve properties and lower costs over those possible with black carbon blacks.

**2:00-2:30 P.M.—The Frosting of Vulcanized Rubber.** ***J. T. Beaudry (Dominion Rubber Co., Ltd., Montreal, Quebec).***

A definition of "frosting" is given as a bloom coming out of certain vulcanized rubber products differing from other types of bloom in that it is quite insoluble in ordinary organic solvents and most of the heavy inorganic acids. Its occurrence is shown as associated with the absorption of ozone and oxygen from the air by the unvulcanized rubber, mostly during the breakdown process previous to mixing. Ordinary compounding ingredients are tabulated in groups of those enhancing, inhibiting or being inert to the development of "frosting." Its prevention is discussed. The probable composition of "frosting" is suggested.

**2:30-3:00 P.M.—Mechanical Rubber Goods with Special Emphasis on Latest Design and Testing Methods for Automotive Parts.** ***F. L. Haushalter (Firestone Industrial Products Co., Detroit, Mich.).***

This paper will review the following subjects and recent advancements made in them:

(1) General definition of automotive applications, with emphasis on both commercial and military vehicles powered by internal combustion engines.

(2) Correlation between requirements of physical specifications and fatigue life of specific parts, including: (a) Torsional rubber bushings; (b) Engine mountings; (c) Radiator hose; (d) Windshield sealing rubbers; (e) Axle bumpers; (f) Accelerator pedals with rubber-encased hinges.

(3) Low temperature creep requirements as affecting design of functional rubber parts.

(4) Comparison between shear type engine mountings and compression types.

(5) Status of 3/8-inch wide fan belt applications.

(6) Future prospects for rubber suspensions for vehicles.

**3:00-3:30 P.M.—The Production and Utilization of Plasticized High-Molecular-Weight Synthetic Rubber. *H. D. Harrington and K. V. Weinstock (General Tire & Rubber Co., Akron, Ohio), and N. R. Legge and E. B. Storey (Polymer Corp., Ltd., Sarnia, Ont.).***

After sixteen months of intensive research and development, Polymer Corporation, Limited, announces a new polymeric material, Polysar Krynol. Produced by the intimate mixing of a high-viscosity polymer, prepared by the low-temperature technique, with an aqueous dispersion of a petroleum derivative, it belongs to the growing family of latex-compounded products.

This novel approach originated in the Research Department of the General Tire and Rubber Company and the production processes were developed by Polymer Corporation, Limited. The joint efforts of these two groups have carried the material from the laboratory, into production, and through factory and service trials in record time for such a radical step in rubber technology. The product makes possible an immediate increase of at least 25 per cent in production capacity of the chemical-polymer plants in North America, with a proportionate increase in essential manufactured goods.

The material may be adopted in factory operations without change in present equipment and may be treated in a manner similar to that of other elastomers polymerized at low temperatures. While slight modification may be required in the factory handling procedure, compounds of Polysar Krynol are outstanding for a low power consumption, lower processing temperatures and freedom from scorch difficulties.

In tread-type compounds, this material is most suitable for compounding with the high-abrasion furnace types of carbon black. It will tolerate high quantities of carbon black and requires a lower consumption of organic accelerators. In laboratory tests such tread compounds have been found to have a good flex life and a low heat build-up under dynamic test conditions. Actual road tests have substantiated these claims and treads made from this material have shown substantially equivalent tread wear to those made from cold rubber.

Examples are given for the utilization of Polysar Krynol in mechanical goods where some of the physical properties are competitive with those of typical natural rubber products. The properties of vulcanizates obtained by blending Polysar Krynol with Polysar Krylene or natural rubber are described.

Laboratory data are presented to illustrate effects of different types of carbon black at various loadings, softener levels, and variation in the accelerator and sulfur content, on the properties of the vulcanizate. The processing behavior of tread-type compounds is described during factory operations. Comparative road test data are presented.

**3:30-4:00 P.M.—Tires: Rubber in Service. *M. G. Morgan (B. F. Goodrich Rubber Co. of Canada, Ltd., Kitchener, Ont.).***

The stresses developed within a tire in service are quite complex but are capable of measurement both by mathematical treatment and actual physical tests. The trend in the automotive industry towards smaller diameter and wider rims on passenger cars is in the direction of increasing the internal stresses on the tire and has resulted in some changes in tire design. This trend has also resulted in increasing the importance of proper tire maintenance if the maximum service is to be obtained.

It is the air in the tire that carries the load and no tire can give satisfactory service unless it is the correct size and type and correct air pressure is maintained. Too much air pressure will result in rapid tread wear and increased tendency toward bruises. Too little air pressure causes excessive flexing resulting in fabric breaks, in addition to rapid or uneven tread wear. Many other factors influence tire service. Some of them are: heat, speed, road surfaces, drivers' habits, topography of the country, balance, cuts and mechanical troubles. Proper steering of a vehicle is achieved by proper toe-in, toe-out, camber, caster and king-pin inclination. These factors also contribute to tire performance on the front wheels, so that when the vehicle is not steering properly excessive wear on the front wheel tires is also occurring.

The tire industry has made great strides towards increasing the service life of its product and with proper maintenance the tire user to-day can look forward to many more miles of trouble-free service than he could in the past.

## New Metal-Forming Process Utilizes Tough Rubber Pad

A REVOLUTIONARY method of forming and drawing sheet metal parts has been developed by the Fort Worth, Texas, Division of the Consolidated Vultee Aircraft Corporation and is now in full production at the Convair plant in that city. Called "Hidraw," the method eliminates the most costly part of a die (die set and female die member), resulting in savings of 50 to 75 percent over conventional tooling. The only tooling necessary with Hidraw is a punch and a pressure pad.

The punch and the pressure pad are mounted on the lower surface of a hydraulic press. A pad of extremely tough rubber on the upper surface of the press serves as the female die. The metal to be formed is placed atop the punch and pressure pad. The press is then raised until the metal is pressed against the rubber pad. As the metal is confined against the rubber and the pressure builds up to several thousand pounds per square inch, the rubber forces the metal down and around the pattern in exactly the form required.

The pressure pad controls the shrinking of the material during the drawing operation. The pad is supported by pins resting on hydraulic cylinders and set to a predetermined pressure. (Pressure up to 10,000 psi is used on some parts.)

Hidraw is particularly suited for metal forming in the aircraft industry, which has relatively short runs of parts and frequent design changes. It is used to make many different types of metal-formed parts, such as aileron nose rib formers, rib stiffeners, saddles for tubing, and junction boxes for electrical wiring.

Because rubber acts as the female die in the process, any thickness of material can be drawn on the same set of tools. A box and cover, for example, can be drawn on the same punch at the same time, or several different parts can be drawn simultaneously. The only limiting factor in multiple drawing is the area of the pressure pad.

Hidraw parts can have punch radii much smaller than those of parts made on conventional dies. With Hidraw, parts have been drawn from aluminum to a depth equal to the diameter. The thinning around the punch radii is negligible, amounting to only two to six percent. (After a part is drawn past the point of tangency of the punch radii, the rubber applies pressure laterally as well as downward, supporting the material and preventing it from being stretched.) When parts are drawn on Hidraw, "springback" is not a major problem. The rubber female die member reduces "springback" to a minimum.

One of the outstanding features of the new process is its simplicity of design and operation. As a result, set-up changes can be made in a relatively short time, and only a few minutes are required to teach an operator the entire method.

Production with the Hidraw process at Convair's Fort Worth division ranges from 130 to 350 parts per hour. Convair is now offering to license other companies to use its rights to the process.

# Editorials . . . . . .

## Rome Conference

THE final press communique issued by the International Rubber Study Group following its 8th meeting held in Rome, discussed in detail elsewhere in this issue, was the usual approved document listing some of the subjects under discussion and containing revised estimates of the production and consumption of natural and synthetic rubber. It carefully avoided any mention of the most important topic of the meeting, although astute followers of these meetings might have wondered why observers from such organizations as the Food and Agriculture Organization, the International Bank for Reconstruction and Development, and the Organization for European Economic Cooperation were present during the sessions.

It will be recalled that a rubber conference at government levels was held in London the week of February 5 by invitation of the British Government. Although practically no publicity of any kind was given to this conference, it was announced prior to the conference itself that it was being called for the purpose of "reviewing the supply and demand situation of natural and synthetic rubber" and to "seek an equitable distribution of 1951 and 1952 supplies." The complete lack of publicity given to the conference led to rumors and speculations concerning another proposed rubber cartel, this time on a world-wide basis, as outlined on this page in our March, 1951, issue.

Although the final press communique of the International Rubber Study Group makes no specific reference to it, the fact is that these discussions were continued at Rome during the official meeting of the Group and occupied a good deal of the time of the delegates. According to informed sources, the views of the producing and consuming countries were not only clarified during these discussions but were also brought closer together. Further, according to these sources, the discussions disclosed the fact that there were serious practical difficulties in the way of "effective" intergovernmental action and the matter was dropped for the time being, with any member government having the option of calling another special conference to pursue the subject further if conditions so warrant.

Specifically, what the major producing and consuming countries desire—or, more specifically, what the British and the Americans are angling for—is an intergovernmental agreement which will channel rubber into major consuming hands at a reasonable fixed price. Surprisingly, as near as can be determined, it is not a "reasonable price" which is holding up any definite action, although the definitions of such a price by producer and consumer are usually miles apart, but rather a reluctance on the part of the major producing and consuming countries to establish minimums and maximums.

To put it in simpler terms, the American delegation would like a short-term agreement and the British delegation would like a long-term agreement. At the London conference it was understood that the United States would be interested in a two-year agreement whereas Great Britain would like to see a five-year arrangement. In either event, specific annual amounts of natural rubber at a fixed price per pound would be involved. Obviously, the nationalistic instincts of each country are involved. Another obstacle to the plan is said to be the reluctance of the United States to throw its synthetic rubber production into any projected world rubber pool.

It must be understood that these discussions are conducted at high government levels and reflect the thinking of government officials who, at the moment, are basically concerned with national security. The United States Government, for example, is interested in any plan which would assure large, immediate quantities of natural rubber at reasonable prices to enable early completion of the strategic stockpile objective. It is extremely doubtful, however, whether the American rubber manufacturing industry seconds any such plan, for any short or long term arrangement of this nature would mean keeping rubber supplies, both natural and synthetic, under government control for at least the length of such an agreement. The industry recognizes fully the need for current controls, but would like to see a door left open when the wind subsides.

# CURRENT NEWS OF THE MONTH

## NPA INCREASES MAY ALLOCATION BY 10% BRINGING CONSUMPTION TO 100% OF BASE

IN an amendment to Order M-2, dated May 1, 1951, the National Production Authority increased the allocation of rubber for civilian use in May by 10% bringing production for civilian use to the full level of the industry's 1949-50 base period. The order set aside 97,100 long tons, including natural latex, for civilian use in May. In April, when all categories were limited to 90% of their adjusted base period, 89,100 long tons were consumed. The May increase does not apply to all civilian uses, however, for the amended order lists a number of products, including passenger car tires and tubes, which will be restricted to their April rate of 90%. Because these items are limited to 90%, production of non-restricted rubber items will be able to rise above 100%, NPA said. The aim, NPA explained, is to make more rubber available for certain vital needs while continuing to curtail production of less essential civilian items.

Mounting synthetic production made the increase possible, NPA said, together with an increase in natural rubber through the establishment of a 60-day inventory limit for manufacturers. Previously, there was a "minimum practicable working inventory" and some manufacturers had set an inventory of more than 60 days for themselves.

Items listed to the April rate of 90% of base period production, in addition to automobile tires and tubes, are: bicycle and motorcycle tires and tubes, garden hose, automotive equipment, household and appliance products, billiard and pool table cushions, mats and matting, bowling balls, knife handles, cafeteria trays, pipe bits, mouth pieces for musical instruments, rods and tubing for fountain pen parts and steering wheels, bath caps, athletic goods, balloons, flavored masticating gum, stationers' supplies, toys, rubber flooring, floor covering, wall covering, rubberized fiber and hair cushioning, and ladies' personal sanitary items, including girdles and dress shields.

### *Order Allows Increases*

All rubber items not specifically limited to 90% are automatically eligible for increased production. These cover a wide field of civilian articles, including truck, trailer and farm equipment tires, industrial belting, industrial hose, milk and food handling equipment, and railroad and street car equipment. Infant goods, including feeding nipples, nursing bottle caps, pacifiers, teethers and teething rings, baby pants, rubber sheeting, medical and dental supplies such as syringe bags, hot water bottles, corn plasters, medicine droppers and toilet and bath sponges are also included as are rubber soles and heels.

The May 1 amendment also allows an extra rubber allotment to replace rubber used to fill DO-97 orders for maintenance, repair and operating supplies in excess of base period production. However, the rating may not be applied to any tire or tube order.

The amendment eliminated from the order a provision that prevented importation of products containing more natural rubber than is permitted in products made in this country. This provision had been included originally to protect the American manufacturer, who was required to use certain percentages of synthetic. NPA pointed out, however, that domestic manufacturers presently are not limited to these percentages in their production if they are unable to obtain the required proportion of synthetic rubber to comply with the specification controls.

NPA has estimated the use of dry rubber for the entire second quarter at 267,100 tons for civilian use and 47,900 tons for military use. In the first quarter, 252,900 tons went to civilian use and 28,500 tons were used for the military. Latex consumption in the first quarter was 600 tons for military use and 16,100 tons for civilian use. Latex consumption for the second quarter was estimated at 1,500 tons for the military and 16,100 for civilian use.

The Rubber Industry Advisory Committee, meeting with officials of NPA on April 23 in Washington, D. C., went on record as desiring 100% cold rubber production, if at all feasible. NPA told the committee members it would make a survey of the rubber industry to determine the uses being made of rubber so that should the materials control plan become necessary, NPA would have essential data.

On May 4, NPA announced that as a result of the elimination of the spare tire as original equipment on new passenger cars, there has been a production increase of more than 35,000 truck and bus tires a week, a gain of about 10%. There has also been an increase of about 15,000 a week in the production of tractor and farm equipment tires as a result of this action, NPA said. NPA expects a further rise in the supply of truck, tractor and farm equipment tires to result from the May rubber order.

An earlier NPA program aimed at increasing the production of camelback has also been reflected in increased production figures. In the first quarter of the current year, 28,694 tons of camelback were produced, approaching the total production in the first two quarters of 1950 when a six-month amount of 33,972 tons were produced.

The consumption of camelback is divided roughly into about 45% for automobile tires and 55% for truck and tractor tires. Thus, about 13,000 tons of camelback went to passenger car tire retread use in the first quarter of this year, enough to retread about 4,850,000 automobile passenger tires.

Incidentally, NPA ruled on April 6 that new passenger automobiles to meet military and other defense rated orders may continue to come equipped with spare tires. According to NPA, the original order banning the fifth tire was not meant to prevent the filling of orders for cars with five tires where a defense (DO) rating is properly applied. The ruling was incorporated in an amendment to the M-2 rubber order.

The same amendment also contained a provision allowing rubber consumers to acquire and use certain waste materials or by-products resulting from the manufacture of synthetic rubber without having to charge their allocations with the full weight of such materials. According to the amendment, GR-S plant clean-up material purchased from the Office of Rubber Reserve will be charged to the extent of 50% and GR-S dried latex drainings, coagulum and preflox at 25%.

### *Realigns Industry Divisions*

Manly Fleischmann, NPA Administrator, in a move announced on April 17, realigned NPA's industry divisions to group related units under four operating heads and to give industry division directors representation in policy determination. Up to April 17, all NPA industry divisions administering orders and regulations governing the production and distribution of the nation's goods for civilian and defense purposes have operated in an Industry Operations Bureau, which no longer exists.

Under the new organization there are 35 divisions dealing with industrial production instead of the previous 20 product groupings. They are grouped according to

their relationship and industry under four assistant administrators who constitute, in effect, an executive committee. The four new bureaus are: Textile, Leather and Specialty Equipment Bureau; Industrial and Agricultural Equipment Bureau; Metals and Minerals Bureau; and Chemical, Rubber and Forest Products Bureau.

The Chemical, Rubber and Forest Products Bureau includes the Chemical Division, Lumber and Lumber Products Division, Pulp, Paper and Paper Board Division, Printing and Publishing Division, Containers and Packaging Division and the Rubber Division. An assistant administrator to head this bureau has not yet been named.

On April 24, Mr. Fleischmann announced the establishment of a three-man board to hear appeals for adjustment under NPA orders and regulations. T. Munford Boyd, on leave as professor of law at the University of Virginia, was named chairman of the new appeals board. The board will hear appeals arising from the denial of applications for adjustment or exception by NPA industry divisions.

Other steps taken by NPA recently to assure the orderly flow of necessary materials included an order (Schedule 3 to M-45, April 18, 1951) placing limited allocations on sulfuric acid. Under the terms of the order, specific authorization by NPA to deliver or use sulfuric acid is required only in the states of Washington, Oregon, California, Arizona, New Mexico, Nevada, Utah, Colorado, Wyoming, Idaho and Montana. The order directs purchasers of sulfuric acids in all states to certify to suppliers the end-uses to which the chemical would be put. Suppliers are required to report to NPA their customers, quantities ordered, and end-uses certified. Filing day is the 10th day of the month before the proposed delivery month.

### *Synthetic Production Progress*

Officials of the Reconstruction Finance Corporation have told Congress that the government is making detailed plans to spend $35,000,000 to get another 100,000 tons of synthetic rubber from its present facilities. At the same time, the agency is laying the groundwork for building additional plants to achieve an even greater boost. It was estimated that the build-up would take 12 months to get the 100,000 ton increase "by effecting process changes and by the modification and addition of equipment" at existing plants now capable of producing 760,000 tons a year.

W. E. Harber, who retired as RFC chairman on April 30, stated it was too early to predict how far the new rubber-oil experimental polymer will go to alleviate the present shortage. Mr. Harber also said he saw no advantage in concentrating the purchase of natural rubber, production of synthetics and allocation of both types in one agency under a single administrator.

However, consolidation of most of the governments' rubber activities seemed a step nearer reality with the appointment of W. Stuart Symington as one-man director of the RFC. Mr. Symington took over his new post on April 30. In handing him the assignment, President Truman expressed the desire that Mr. Symington merge into one agency, as much as possible, rubber purchases and operations. The President indicated he wants RFC to take over the purchasing activities of the General Services Administration and the allocation powers of NPA. The President has the power to order such a step without the approval of Congress.

Gerald B. Hadlock, executive director of the Office of Rubber Reserve, in an appearance before the Senate Small Business Subcommittee on April 16, stated that his agency has reached a limit into bringing small rubber companies in as operators of government synthetic rubber plants. Small companies involved as junior partners in the program get a share of the operating fee granted the larger, prime operator. Mr. Hadlock denied that the RFC dictates how the fee should be split.

The RFC official stated that in 1950, the Firestone Tire & Rubber Co. earned $1,201,000 in operating fees; U. S. Rubber Co., $1,069,900; B. F. Goodrich Co., $884,514; Goodyear Tire & Rubber Co., $863,704; Copolymer Corp., $588,886, and General Tire & Rubber Co., $345,387.

Meanwhile the Houston, Texas, government-owned synthetic rubber plant operated by the Goodyear Synthetic Rubber Corp. neared the billionth pound on synthetic rubber output as part of its facilities moved into accelerated production on 2,000,000 pounds of a new type of tire rubber. This new material, which was developed in the laboratories of the Goodyear Tire & Rubber Co., will be used by the company at its tire plants. An initial production run of 300,000 pounds, made in March, has already found its way into tire treads.

An approximate loss of 500,000 pounds of neoprene was expected as a result of difficulties at the Louisville, Ky., plant of E. I. du Pont de Nemours & Co. Another deterrent to expanding synthetic rubber production came from Canada, where an explosion at the Sarnia plant of the Polymer Corp. started a fire which caused considerable damage. The explosion occurred in a building at the west end of the plant, in which butadiene is normally processed.

### Strikes Rich Rubber "Mine"

Amadee Gobeil of Auburn, Maine, had a gully on his property filled with rubber composition scraps two years ago so he could level it off. Now he is "unfilling" the gully and getting paid $80 a ton for the scraps. Mr. Gobeil, a barber, was offered $20 a ton recently for his "mine" of rubber-rich shoe scraps. He declined, saying it would cost too much to refill with other material. A friend, however, advised Mr. Gobeil that his gully-filler had a high value and the two men are excavating it with power equipment. Two railroad carloads of the scrap have already been sent to Akron, Ohio, "smelters".

In a move to increase the production of butadiene, the government has authorized the Chemical Division of the Koppers Co., Inc., to reactivate the fourth and last butadiene unit of the federally owned plant at Kobuta, Penna. This unit, like the others, had been in standby condition since World War II. After the Korean emergency, Koppers was asked to reactivate two units. Later a third unit was ordered reactivated and now the fourth.

The first of the units began operating last November and the second a few months later. In March, a fire in one unit shut it down. The third unit went into production the last of April. The fire-damaged unit is expected to be back in operation by June, company officials said. Several months will be required to place the fourth unit in operation. When all four units are working, the total monthly production of butadiene is expected to amount to about 20,000,000 pounds. Koppers built and operated the butadiene plant for the government during World War II.

### Celanese Plans Chemical Plant

Celanese Corp. of America has announced plans for the construction of a modern chemical plant located at Pampa, Texas, for the production of materials to be used in the manufacture of synthetic rubber, plastics, yarns, explosives, pharmaceuticals and other products. Erection of the plant is calculated to serve a dual purpose, according to company officials. It will not only prove an additional source of the raw materials necessary to meet the increasing demand for the company's products, but will also broaden the supply of chemicals for an accelerated defense program. Output of the new plant will supplement the chemical processing activities of the company at its Bishop, Texas, plant. The new plant site is in the heart of a rich petroleum area which will furnish both the hydrocarbon feed stocks for chemical processing and the natural gas for fuel.

### Firestone Awarded Ordnance Order

An initial order calling for the delivery of $4,600,000 worth of tank cannon has been awarded to the Firestone Tire & Rubber Co. by the Ordnance Department of the U. S. Army. Delivery on the first part of the contract is scheduled to begin during May. Approximately 600 persons will be employed at the plant. The cannon, a new addition to the nation's armament, is designed for mounting on a tank being manufactured by private industry. Firestone is manufacturing the complete cannon.

Printed Copies of "Simplified Practice Recommendation 242-51, Vinyl and Pyroxylin Coated Cotton Fabrics", are now available, the Commodity Standards Division of the Office of Industry and Commerce, U. S. Department of Commerce, reported recently. Copies may be obtained from the Government Printing Office, Washington 25, D. C., for 5c per copy. A discount of 25% will be allowed on orders of 100 or more copies.

## APPLICATION OF NPA RATINGS AND PRIORITIES INTERPRETED

It has become evident within the past few months that many persons are confused as to the meaning and application of "DO" rated orders and the basic priorities system which the National Production Authority has established to meet the current emergency. NPA Regulation *2*, as amended, and Interpretation 1, issued in conjunction therewith on February *27*, 1951, spell out the regulations pertaining to these rated orders and the basic priority system.

According to the regulation a "rated order" means any raw, in process or manufactured commodity equipment, component, accessory, part, assembly or product of any kind. A rating is assigned when NPA or some other authorized government agency deems the production, assembly, etc., of some article to be necessary to the national defense. This rating is identified by a "DO" (defense order) symbol and followed by two digits identifying the particular procurement program.

Any firm, person, etc., receiving a "DO" rating may apply that rating to get delivery of material or the performance of services necessary to the production of the basic article. Regulation *2* prescribes certain limitations upon the issuance and the extension of "DO" orders. It also prescribes channels to follow for odd or unusual cases and cites reports which must be completed.

Among the "DO" code numbers currently in use, DO-97 and DO-98 are of particular interest. A DO-97 rating is assigned specifically to Maintenance, Repair and Operating Supply Requirements (MRO). DO-97, however, does not cover production machinery. NPA Regulation 4 (as amended April 16, 1951) and Directive 1, issued in conjunction therewith on February *27*, 1951, provide a uniform procedure by which any business enterprise, government agency, or public or private institution may use a DO-97 symbol to obtain limited quantities of maintenance, repair and operating supplies as well as minor capital additions.

The regulation does not limit the quantity of MRO or capital additions that a person may obtain without using this "DO" rating, except that, if he makes any use of the rating in any particular calendar quarter, his total acquisition of MRO (rated and unrated) for such quarter becomes subject to the limitations of the regulation.

A DO-98 rating applies to production equipment for certain private contractors. Manufacturers having contracts with the government—or supplying material as subcontractors—are eligible to receive the DO-98 rating. On the other hand, DO-19 is used for direct procurement by the Department of Defense or some other authorized government agency. The use of a DO-98 rated order will enable a purchaser to obtain new equipment on shorter delivery, when necessary. It also facilitates application for a Certificate of Necessity under which a manufacturer may charge off a major capital investment in five years. It will also facilitate the purchase of equipment with the aid of a government V-Loan.

NPA has stated that further changes in pertinent regulations are being considered. Persons concerned should make every effort to fully acquaint themselves with changes as promulgated so that their interests and the interests of the nation are best served.

### Expanding Acetylene Production

A new chemical process for the production of acetylene, which has been in commercial operation for over a year at the Texas City, Texas, plant of the Carbide and Carbon Chemicals Co., a unit of Union Carbide and Carbon Corp., is due for expansion. The method employed is a partial oxidation process involving the high temperature reaction of methane and oxygen. The two highly reactive feed materials are combined chemically to produce a gas mixture containing essentially acetylene, with smaller percentages of carbon dioxide, methyl acetylene, diacetylene, vinyl acetylene, and other residual gases. Present plans are that the capacity of the Texas City unit will be greatly enlarged, subject to receipt of government priorities.

### DPA Small Business Program

On April *23*, Defense Production Administrator William H. Harrison, since retired, announced adoption of a new four-point procurement policy to increase participation of small business in defense production. The policy, Mr. Harrison said, has been accepted by all government agencies concerned with defense procurement and production. The policy was developed by the DPA Production Executive Committee jointly with the DPA Small Business Executive Committee composed of representatives of defense agencies concerned. The four points are as follows:

(1) To bring into the defense effort on a prime contract, subcontract or purchase part basis every qualified producer who can be used so that orders can be spread across as wide a base as possible.

(*2*) To find and put to use the productive facilities of small firms.

(*3*) To give small manufacturers all necessary information concerning government needs and the steps they should follow in obtaining subcontracts as well as prime contracts.

(4) To develop and install procurement procedures which will encourage prime contractors to subcontract to small firms the maximum business possible.

## ANOTHER EXAMPLE OF INCREASING USE OF RUBBER IN ARMED FORCES

Utilizing a waterproof wardrobe made completely of rubber by the U. S. Rubber Co., these U. S. Navy "frogmen" depicted above are members of an underwater demolition crew. Frogmen are able to remove mines and perform other underwater jobs because of their unique outfits. Rubber's role in defense, of course, is not confined to the frogman suit. Rubber goes to war in many other ways. U. S. Rubber, for example, is producing defense products for every branch of the service. The company produces tires, tank tracks, footwear, insulated wire, raincoats, ponchos, mountings, hose, transmission belting, inflatable mattresses, storage tanks, battery separators, and hundreds of other products.

U. S. Rubber also produces a full line of aircraft products including bullet-sealing fuel tanks, flexible ducts, vibration mountings and hose for the de-icing of airplanes. Still other items include inflatable shelters, "Mae West" life preserver vests, and joint sealing compounds for air strips. The company also produces Ustex yarn for parachute harness webbing, plastic airplane parts and many other items made from plastics, textiles and chemicals. U. S. Rubber has also been called upon to reopen the ordnance works at Kankakee, Ill.

# SENATE SUBCOMMITTEE ON RUBBER TEMPORARILY SUSPENDS HEARINGS

Pending the reorganization of the Reconstruction Finance Corporation, the Subcommittee on Rubber of the Select Committee on Small Business of the United States Senate temporarily suspended hearings on April 30 for a two-week period. Subcommittee chairman Senator Guy M. Gillette (Dem., Iowa) said that the subcommittee needs the two weeks in order to observe what happens in the RFC reorganization. He added that the newly appointed industry "watchdog committee" of small plant executives had asked for time to study new government directives on the use of rubber. It is expected that one of the first witnesses to appear before the subcommittee when it reopens hearings will be W. Stuart Symington, new RFC head.

### *Named to "Watchdog" Group*

Senator Gillette had proposed the industry "watchdog" group as a liaison between the subcommittee and NPA. Most of its members have testified before the subcommittee in the past. Senator Gillette appointed Donald F. Pratt of the Durkee-Atwood Co., Minneapolis, Minn., as chairman, and Furber Marshall of the Carlisle Corp. as vice-chairman of the "watchdog" committee.

Others named to the 21-man group are Irving Eisbrouch, Dayton Rubber Co.; Harry McCreary, McCreary Tire & Rubber Co.; J. F. McCann, Dunlop Tire & Rubber Co.; Vincent Catozella, O'Sullivan Rubber Co.; Thomas Murray, Voit Rubber Co.; Miles Smith, Carolina Rubber Hose Co.; Norman Johnson, Griffith Rubber Co.; W. O. Dismuke, Dismuke Tire & Rubber Co.; Pierce Sperry, Sperry Rubber & Plastics Co.

Also Raymond Thornburg, Pawling Rubber Co.; Lloyd Monroe, Hawkeye Rubber Co.; George Toney, American Wringer Co.; Newton D. Baker III, Harris Products; G. C. Waldrop, Grand Prairie Rubber Co.; J. B. Clift, Pretty Products, Inc.; Milton Seidenman, Monarch Rubber Co.; A. H. Smith, Kerite Co.; Arthur Nolan, Latex & Rubber, Inc., and W. W. Marsh, National Association of Independent Tire Dealers.

### *Preparedness Subcommittee Report*

A report of interest on rubber is expected from the Preparedness Subcommittee of the Senate Armed Services Committee in the near future. The report will be the third issued by that subcommittee since last September. Lately, the subcommittee has stressed the need for stockpiling natural rubber now against the day when it might not be so available. Industry executives testifying before the Small Business Subcommittee have argued for an end or at least a slow-down in stockpiling.

Before the Small Business Subcommittee recessed for a two-week period, Jesse Larson, General Services Administrator, testified that the day when the government will stop stockpiling rubber is not too far away. He made clear, however, that his agency is still in the market for stockpile rubber, and will continue to buy until the government goal is reached despite suggestions from some industry members that the government halt its stockpile purchase program.

Mr. Larson refused to tell the subcommittee whether GSA was buying rubber at the moment. He said he did not wish to say anything which might support the market. He did say that GSA's rubber buying program has been predicated on a temporary ceiling price of 65c a pound. "Since January, 1951," he said, "we have not paid more for rubber than this amount. However, the price on world markets has consistently remained from 4 to 12c above this price."

Mr. Larson's review of GSA buying policies was part of his sharp criticism of testimony by industry witnesses who have appeared before the Senate group. It was designed to counter the charge that Federal buying has been responsible for the rise in rubber prices.

The stockpile official contended that the increase in prices has been due mainly to an excess of demand over supply. To remedy this, he recommended as "absolutely necessary" a boost in U. S. synthetic rubber capacity from the present 840,000-ton yearly level to 1,000,000 tons a year. He said the Munitions Board is also seeking a "substantial increase" in synthetic production capacity. Mr. Larson suggested further that "consideration be given to the production of natural rubber through the growing of guayule plants in the southwestern U. S. and natural rubber in Central and South America."

### *Larson Cites Industry*

Mr. Larson charged that spokesmen for the rubber industry have shown a "marked lack of appreciation" of U. S. rearmament problems. "Honest public and military officials, whose patriotic motives cannot be questioned, are being criticized daily by those who desire that their particular industry be permitted to continue in operation at the fullest capacity ever attained, regardless of the sacrifices others are called upon to make," he said.

During his testimony the GSA executive issued a point-by-point reply to criticisms of the government's rubber program that had been voiced before the committee. He said that use of a historical base period in allocating rubber supplies "can result only in forcing small rubber producers into bankruptcy." He pointed out that since World War II the large rubber manufacturers operated at the highest rate of output in their history to meet the demands of booming automobile production, but the smaller producers in this period could seldom operate at capacity because they did not share in the business generated by production of new cars. Because of this situation, he suggested that allocations be based on productive capacity, with a minimum level set "across-the-board" to assure small producers enough rubber to continue operations.

Mr. Larson insisted that GSA must continue to be the exclusive buyer of all natural rubber "because of the chaotic situation which existed and still exists in the rubber industry as a result of the runaway prices in world rubber markets." He pointed out that GSA stayed out of the market completely during the October-December 1950, period, but during this time rubber prices still continued to rise, even though American buyers had slowed down their own purchasing in the hope of forcing down the market price.

W. Stuart Symington, newly-appointed head of the Reconstruction Finance Corporation, in a recent interview stated that America's natural rubber stockpile is still not sufficient. He added that those who believe there is enough rubber available now to fight a rather lengthy war, overlook the fact that this same rubber would have to support the civilian economy.

Mr. Symington also noted that high prices of natural rubber are cutting down the time to reach the stockpile goal. He also stated that there should be more coordination between the government's various rubber activities. Mr. Symington noted that if he is going to run the synthetic program he had better know something about natural because "the two programs are inexplicably tied together."

### *Glen Explains Actions*

Earl W. Glen, former director of rubber allocations for the NPA, made his long-awaited appearance before the subcommittee on April 10. Mr. Glen testified that last August, NPA officials called him in and told him to draw a rubber order allocating dwindling supplies of rubber to industry. He said he never was consulted about the decision to allocate. All he was to do was to write the order.

The order parcelled out rubber to industry on the basis of use in the past. Mr. Glen thought, however, that this method could be improved. He said he began to allocate rubber on the basis of a rubber plant's capacity to fabricate it. This, he believed, was more in line with a dictum from Congress that small business be given every possible break in the defense-rearmament program.

Mr. Glen disclosed that he purposely allowed too much rubber consumption last Fall. That was in order to work out a fair base usage rate for every company in the industry, he said. Once the rate was figured, he expected to cut everybody back across the board and eliminate the need for allotment adjustments after the cut was made, he said.

Mr. Glen told the subcommittee the return of a free world market for natural rubber would end many of the nation's rubber ills. He said that industry, competing against the government for natural, would bring rubber out of hiding and at prices lower than those now being paid.

### *Subcommittee Hears Spencer*

In his fourth appearance before the Senate Small Business Subcommittee, Leland E. Spencer, head of the NPA Rubber Division, strongly defended the order which eliminated the spare tire as standard equipment on new automobiles. He said it would have been possible to achieve the government's aim of holding passenger car tire output to 90% of the industry's

base without issuing any order effecting spare tires. But this, he said, would have meant that the "Big Four," which supply 99% of the original equipment tires used by the industry, would have been unable to keep up deliveries of replacement tires to their dealers.

If the government order hadn't been issued and if each of the "Big Four" had continued to supply all the tires required for the auto industry, for fear of losing out in this major market to a competitor, the 16 other tire making companies would have taken over the "Big Four's" replacement tire business, he said. As it is, the "Big Four" can continue to make their proportionate share of replacement tires.

Meanwhile, automobile manufacturers were ordered on May 1 to make allowance in their prices for the fact that they no longer supply a spare tire and tube with new passenger cars. The order, issued by the Office of Price Stabilization, continues indefinitely the prices at which passenger cars were frozen last December, but requires that an adjustment be made to compensate for the absence of the fifth tire.

### *Recommends Use of Peat*

The subcommittee also heard testimony from Dr. Derso Sebeok Shybekay, executive vice-president of the Peat and By-Products Council of America, who discussed the conversion of peat into carbon black and also its use as a base for synthetic rubber.

Dr. Shybekay asked for $1,500,000 so that he could build a small pilot plant and produce his synthetic and his carbon black in batches large enough for testing. He also stated that peat could be used to replace dwindling coal supplies for generating the electric current needs of industry. Peat-fired turbines are a common thing in Ireland, he said. The cost of producing 24 kilowatt hours of electricity with coal is $3.10, Dr. Shybekay said. "I can give you the same thing for 56c from peat," he asserted.

## Borden Plans Resorcin Plant

The Chemical Division of the Borden Co. has applied to the National Production Authority for a Certificate of Necessity to construct a plant in Tacoma, Wash., to produce resorcin. Assuming NPA grants the certificate, which permits accelerated amortization of construction costs for tax purposes, the company hopes to have a two-story 50,000 square-foot plant in operation before the end of the year. It will be the first of its type on the West Coast and will produce at least 1,000,000 pounds of technical grade resorcin annually. Company officials stated that Borden's resorcin interest is mainly in the adhesive field and in the plastics industry. The company produces about one-half the nation's resorcin adhesives supply. Total U. S. production of resorcin is currently about 3,500,000 pounds and only two companies—Koppers Co. and the Heyden Chemical Co.—are making it at this time. Borden estimates 1951 resorcin needs of the adhesives industry at about 1,500,000 pounds and the company's own needs at about one-half of this figure.

## Muehlstein Award Presented

The photograph above shows President H. E. Simmons (left) of the University of Akron accepting a check from Henry M. Rose, vice-president of H. Muehlstein & Co., Inc., inaugurating the new Julius Muehlstein Memorial Award. This award, which will go each year to some deserving student in the field of rubber chemistry, was presented at the recent opening of the new Knight Chemical Laboratory.

## Lewis & Conger Safety Awards

The Sixth Annual Home Safety competition sponsored by Lewis & Conger, held in New York City on April 17 at the Waldorf-Astoria Hotel, featured the presentation of safety awards to "Rubbermaid Shelf-Kushions," and "Vinyleen Plastic Window Shades." Wooster Rubber Co., Wooster, Ohio, received the award for its "Shelf-Kushion" because in use, it provides a safe, cushioned base that stops glassware chippage, does away with the accumulation of food particles on shelves, and permits air-drying of virtually every type of glassware. It also acts to prevent breakage. Weis & Klau Co., New York, N. Y., received an award for the "Vinyleen Plastic Window Shade" which is said to reduce the hazard of fire in the home. Made of vinyl plastic film, the shade is fire-retardant and washable.

## Doubt Rubber Cancer Hazard

Scientists from the University of Chicago are presently investigating a possible cancer hazard in the rubber industry. It was recently reported at the Cleveland, Ohio, meeting of the American Association for Cancer Research that certain chemical extracts from processed rubber have been found capable of causing skin cancers in mice. One of these extracts is carbon black, the scientists said. However, the doctors reported that there has been no known case of cancer among workers in the rubber processing field where it could be traced to the chemicals now under study. Statistics do not bear out a higher incidence in the rubber industry at all. Akron industrial physicians agreed that there was no higher rate of cancer, skin or any other type, in the rubber industry than in the general population of Summit County.

## RUBBER SHIPMENTS TO CHINA BANNED BY BRITISH GOVERNMENT

Export of crude rubber to Communist China for the balance of 1951 has been banned by the British Government. The announcement was made by Sir Hartley Shawcross, who recently succeeded Harold Wilson as president of the British Board of Trade, during a debate in the House of Commons on May 10 on the supply of strategic materials to China. The announcement followed on the heels of vigorous protests made to the British on mounting shipments to Russia and Russian-dominated countries.

The banning of further rubber shipments to China was initially urged by Winston Churchill who suggested the British Government take no action which would adversely affect Anglo-American relations. He stated that "no minor matters should be allowed to stand in the way of fullest, closest intimacy, accord and association with the United States."

In announcing the ban, Sir Hartley indicated that the British Government would protect British colonial governments which had been shipping rubber to Communist China by buying all the rubber for which forward contracts had been made "in good faith" before the imposition of the new restrictions. He also voiced the hope that all other rubber-producing countries would refrain from providing alternative sources of supply "which might help to build up the Chinese war potential."

The debate in the British House of Commons was touched off by recent disclosures of the British Colonial Office to the effect that British Malaya had sold 120,000 tons of rubber to Communist China and 40,400 tons to Russia in the nine-month period ended March, 1951, or since the outbreak of the Korean war. Malayan shipments to China for the entire year of 1949 totaled 27,500 tons.

During the debate government officials pointed out that all rubber shipments from British Malaya have been subject to export licensing control since April 9. The purpose of this control was to prevent unduly large quantities being sent to any particular destination. In most rubber quarters, however, it was believed that the imposition of these export controls was a case of locking the stable after the horse had been stolen.

According to prominent American rubber officials, China's capacity to consume rubber is approximately 25,000 tons a year and therefore it must be assumed that China is either stockpiling rubber or is re-shipping huge quantities direct to Russia. These officials also state that the heavy shipments to Communist China are in part responsible for current high prices.

## Add to Goodrich Research Center

Construction of additional facilities for the Research Center of the B. F. Goodrich Co. at Brecksville, Ohio, has already begun, according to Dr. Howard E. Fritz, vice-president in charge of research. The new construction will include additions to existing buildings and will be ready for occupancy in October.

## QUEBEC GROUP, SPI AND SPE HOLD JOINT APRIL MEETING

The Quebec Rubber and Plastics Group held its final dinner and technical meeting of the 1950-1951 season on April 19 at the Queen's Hotel, Montreal, Quebec, Canada. The meeting was held under the joint auspicies of the Society of Plastics Engineers, the Society of the Plastics Industry and the Quebec Group. Approximately 70 members and guests attended the dinner, while 90 attended the technical meeting which followed. Principal speaker for the evening was Dr. Earl S. Ebers, sales manager of plastics and resins of the Naugatuck Chemical Division, U. S. Rubber Co. Dr. Ebers spoke on "Polyesters," and accompanied his talk with demonstrations covering the use of these materials.

In Dr. Ebers' talk, the earliest applications of low pressure laminates were cited as wing liner board and Doron armor. When war contracts were cancelled in November, 1946, the many military applications of low pressure laminates ceased and no civilian markets were apparent. Business since then has grown slowly but surely. The outstanding difference of the polyester resins is that the cure is by polymerization and it evolves no by-products. This feature, coupled with low viscosity, allows low pressure molding and contact laminating. In this field, 300 psi is generally regarded as the top pressure, he said.

### *Polyester-Glass Combinations*

Glass is the recommended filler for moldings and laminates, Dr. Ebers said. The polyester-glass combination has high impact resistance and is resilient as demonstrated by its use in boats. The material is also corrosion and chemical resistant and such applications as washing machine liners and various containers for corrosive chemicals are proper. Other applications are in decorative and lighting panels, outdoor signs, electrical insulations and housings, fishing rods and tubing and pipes.

Casting resins have not been as successful as was hoped for although some potting is done. A wide range of resin properties is available. The viscosity may range from 1800 poises to 3 poises and a crystaline resin is also available. Self-extinguishing resins and flexible resins are available and can be blended with standard resins to any degree. In the curing process a gel forms and the reaction is exothermic and will proceed to ultimate cure. The resins cannot be overcured within reasonable times or temperatures.

An example of the degree of exothermic reaction is the fact that an 8 gram resin sample cured in an 80°C. water bath will develop a temperature of 245°C. Benzoyl peroxide is generally used (usually in paste form) for cures at 100 to 150°C. Lupersol DDM is frequently used for room temperature curing; the pot life can be varied from 1 to 24 hours by adjusting the concentration of catalyst.

In forming polyester-glass parts, the lay-up of the laminate may be by simple contact or by pressure on a rubber blanket. A new and controversial method of molding is the "suck up" or vacuum impregnation. Matched metal molds make the best parts and the resin is generally poured into the mold and forced throughout the preform by the pressure of the plunger. These matched metal molds are usually not as rugged as molds for phenolics, but should have good mass to absorb the fluctuations of heat. The plunger should be "telescopic" so that it can follow through to compensate for the shrinkage of the molded part. Glass-reinforced molding compounds are being used; the material flows readily even into large thin webs and can be easily transfer molded. A part weighing 23 pounds is now being made, Dr. Ebers concluded.

## Coming Events in the Rubber Industry

**May 18.** Buffalo and Ontario Groups, Joint International Meeting, General Brock Hotel, Niagara Falls, Ont., Canada.

**May 22.** Washington Rubber Group, Cosmos Club, Washington, D. C.

**May 24-25.** S.P.I., Annual National Meeting, Greenbrier Hotel, White Sulphur Springs, W. Va.

**June 14.** New York Rubber Group, Summer Outing, Doerr's Grove, Milburn, N. J.

**June 15.** Akron Rubber Group, Summer Outing, Firestone Country Club, Akron, Ohio.

**June 15.** Boston Rubber Group, Summer Outing. (Tentative).

**June 16-17.** Los Angeles Rubber Group, Summer Outing, Del Mar, Calif.

**June 18-22.** A.S.T.M., Annual Meeting, Chalfonte-Haddon Hall, Atlantic City, N. J.

**June 21.** Rhode Island Rubber Club, Summer Outing, Metacomet Golf Club, East Providence, R. I.

**June 22.** Detroit Rubber & Plastics Group, Summer Outing.

**June 23.** Southern Ohio Rubber Group, Summer Outing.

**July 20.** Buffalo Rubber Group, Summer Outing.

**Aug. 7.** New York Rubber Group, Golf Tournament, Baltusrol Club, Springfield, N. J.

**Aug. 24.** Philadelphia Rubber Group, Summer Outing, Cedarbrook Country Club, Philadelphia, Penna.

**Sept. 3-7.** American Chemical Society, 75th Anniversary Jubilee Meeting, New York.

**Sept. 5-7.** Rubber Division, A.C.S., Commodore Hotel, New York, N. Y.

**Sept. 10-13.** Section on Elastomers and Plastomers, 12th International Congress of Pure and Applied Chemistry, New York, N. Y.

**Oct. 5.** Detroit Rubber & Plastics Group, Fall Meeting, Detroit-Leland Hotel, Detroit, Mich.

**Oct. 19.** Akron Rubber Group, Mayflower Hotel, Akron, Ohio.

**Oct. 19.** Boston Rubber Group, Fall Meeting, Somerset Hotel, Boston, Mass.

**Oct. 23.** Buffalo Rubber Group, Fall Meeting, Hotel Westbrook, Buffalo, N. Y.

**Oct. 23.** Washington Rubber Group, Annual Banquet, Cosmos Club, Washington, D. C.

**Oct. 26.** New York Rubber Group, Fall Meeting, Henry Hudson Hotel, New York, N. Y.

**Nov. 16.** Philadelphia Rubber Group, Poor Richard Club, Philadelphia, Penna.

**Dec. 14.** Boston Rubber Group, Xmas Party, Somerset Hotel, Boston, Mass.

**Dec. 14.** Detroit Rubber & Plastics Group, Xmas Party, Detroit-Leland Hotel, Detroit, Mich.

**Dec. 14.** New York Rubber Group, Xmas Party, Henry Hudson Hotel, New York, N. Y.

**Dec. 18.** Buffalo Rubber Group, Xmas Party.

### Goodyear Votes Financing Plan

Preferred stockholders of the Goodyear Tire & Rubber Co. meeting in Akron, Ohio, on April 30, approved a $100,000,000 financing program for the company. Goodyear directors had recommended an increase of $100,000,000 in the company's funded debt in addition to the $95,001,000 now outstanding. The company announced it would proceed with plans to borrow the entire sum on 20-year 3½% unsecured notes from the insurance companies holding its present notes. It is the intention of the company to utilize the new funds for additional plant and machinery and for working capital.

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## NSC RUBBER SECTION ANNOUNCES PROGRAM FOR OCTOBER MEETING

The Rubber Section of the National Safety Congress has announced a preliminary program for the meeting to be held on October 9 and 10 in Chicago, Ill. On Tuesday afternoon, October 9, Stanley Wright (Inland Mfg.) will make the opening address and report on sectional activities. A symposium on "Current Hazards in the Rubber Industry" will then be held. Five papers will be presented. The papers and authors are:

"Solvents" by W. J. Dooling (Hood Rubber); "Control of Chemical Hazards in the Rubber Industry" by F. W. Sands (U. S. Rubber); "Post-Dip Operations" by Art Kelson (Goodyear); "Conveyors and Blenders" by J. L. Dean (Firestone), and "Power Trucks" by R. S. Farnum (U. S. Rubber).

On Wednesday afternoon, October 10, R. A. Bullock (Corduroy Rubber) will give the report of the Nominating Committee. Two papers will be presented under the general heading of "New Developments in Rubber Reclaiming." A. J. M. Kerrigan (U. S. Rubber Reclaiming) will speak as will B. M. R. Batche (Xylos Rubber). R. V. Righter (GMC) will speak on "A Plant Manager Looks at His Safety Program" to close the meeting.

### Akron Group Elects Officers

The results of a letter-ballot for the election of officers for the 1951-52 season were announced at the Spring Meeting of the Akron Rubber Group held on April 6 at the Hotel Mayflower in Akron, Ohio. Approximately 450 members and guests were in attendance. Members elected to office for the new season are: *Chairman*, Dale F. Belmey (Goodyear); *Vice-Chairman*, Lawrence M. Baker (General Tire); *Secretary*, K. J. Kennedy; *Treasurer*, V. L. Petersen. Principal speaker of the evening was Dr. Fred E. Ayer, Dean Emeritus, School of Engineering of the University of Akron, Akron, Ohio. Dr. Ayer delivered a talk entitled "1951 Model—35,000,000 Jackass Power Rating." The speaker commented upon the 35,000,000 voters who failed to go to the polls in the last national election.

### Biggs Boiler Works Reorganized

Reorganization of the Biggs Boiler Works Co. and the election of new top management was recently completed at a special meeting of stockholders and directors of the firm in Akron, Ohio. T. E. Krizanek, formerly executive vice-president of the company, has been elected president succeeding K. M. Smith. Byron H. Martin, previously a vice-president of Biggs, has been named executive vice-president of the company. Michael M. Weiss, president of Allied Commonwealth Corp. of Newark, N. J., has been named chairman of the board. The changes in top personnel came about as the company revealed it had the largest backlog of orders on its books in its history. Founded in 1887, Biggs produces a variety of heavy equipment.

## U. S. RUBBER DEVELOPS 55-GALLON SYNTHETIC RUBBER-FABRIC DRUM

U. S. Rubber has developed a new 55-gallon synthetic rubber-fabric drum, suitable for shipping liquids, which can be collapsed after emptying and is returnable and re-usable. Limited quantities are already being produced for essential uses in the petroleum and liquid chemical fields. The new drum should effect sizable savings in return shipping costs, since more than 2,500 collapsed drums can be shipped in a standard railroad box car that would hold only 300 rigid drums, the company states.

Experimental tests made by the company indicate that the new drum will be suitable for the shipment of oils, greases, fats, acids, paints, emulsions, soaps, dry powders and a variety of pharmaceutical and industrial chemicals. It is also believed to be practical for transporting liquids by air for the military and for dropping liquids by parachute to ground troops.

The new drum is made of Ustex cord fabric, impregnated with synthetic rubber and molded in one piece. The result is a tough, flexible, synthetic rubber-fabric drum approximating the size of a regular barrel or drum. It is equipped with simple yet effective fittings for filling, emptying, lifting, and handling.

The drum is said to be the result of nearly three years' development and testing work by U. S. Rubber. It is made of material that is non-corrosive, non-absorbent and highly resistant to weathering. It is easy to fill, empty and clean and needs no venting. When full, it retains its shape without appreciable distortion. When empty, it can easily be further collapsed for return shipment and re-use. An empty 55-gallon synthetic rubber-fabric drum weighs less than 30 pounds.

*Since the new drum automatically collapses as liquid is withdrawn, no venting is necessary.*

Other features of the new drum include its rounded corners which permit it to be handled easily. With the addition of a metal plate, the drum can be completely emptied from an overhead hanging position, the company maintains.

The new type drum is considered to have safety advantages, since it needs no venting while being filled or emptied, and therefore can eliminate hazards sometimes encountered in handling certain acids and liquid combustibles. Liquids that oxidize easily can be withheld from exposure to air during removal from the drum. Since inner surfaces have no corner pockets, liquid contents can be completely removed and the inside quickly cleaned.

The U. S. Department of Defense has prepared a new booklet, "Index of Military Purchasing Offices," as a guide to industry in selling to the military departments. Copies may be obtained from the Munitions Board, Washington 25, D. C.

*The photograph above depicts the 55-gallon synthetic rubber-fabric drum developed by U. S. Rubber as it appears when filled, at left; in its collapsed state, foreground; and a drum, at right, being filled.*

# 8TH INTERNATIONAL RUBBER STUDY GROUP MEETING HELD IN ROME

The 8th International Rubber Study Group meeting recently concluded in Rome, Italy, brought forth the fact that nations busy stockpiling natural rubber will have only about 340,000 long tons on which to draw this year if present estimates of world supply and demand hold up. Delegates at the meeting were told to look for total world natural rubber production of 1,870,000 long tons in 1951 including natural latex. At least 1,530,000 long tons of this amount will be consumed, according to the forecasts of the experts. The accompanying tables indicate revised estimates for 1951.

The meeting put the world's estimated synthetic rubber production at 915,000 long tons, of which 900,000 long tons will be used during the year. A report on the meeting by the U. S. State Department noted that the balance of estimated production over estimated consumption of both natural and synthetic rubber is expected to be absorbed into both governmental and commercial stocks. The delegates considered natural latex consumption separately. Production, they figured, will run around 120,000 long tons this year with consumption in the neighborhood of 105,000 to 110,000 long tons.

### *Expanding Rubber Use*

The delegates were also concerned with how to expand ways in which rubber can be used. The State Department's report stated the "meeting considered that while recent market conditions have tended to retard the progress in directions where price was a major factor, the tendency should not be allowed to obscure the need for long-term carefully planned and vigorously pursued development activity which remain a matter of vital importance to the industry." Up for special discussion, the report added, was the use of natural rubber on highways, in tires driven in tropical countries, and in new applications for latex.

The Group noted progress in some aspects of packing, but desired to place on record the views expressed by the representatives of certain consuming countries, that producers should strive constantly to maintain and, where necessary, improve the quality of their rubber. Remilling organizations should also seek better methods to improve not only the condition but the cleanliness of the remilled grades which are consumed principally in the United States.

Also reviewed were developments in the supply of "specification rubber" now known as "technically classified rubber." It was noted that several thousand tons had been provided during 1950. The Group hoped that the substantial quantities which would reach consumers during 1951 would enable it to give further information on what was believed to be a progressive step at its next meeting.

While the views of the participating countries had been brought somewhat closer together by the conference, the meeting closed without an agreement having been reached on an equitable distribution of rubber supplies and stable prices. Italian sources said there appeared to be two main difficulties: the problem of guaranteeing long-term markets to producer countries in return for their undertaking to provide fixed quantities at fixed prices during the present period of worldwide buying, and the reluctance of the United States to throw its synthetic rubber production into the projected world rubber pool.

Given places on the Management Committee at the Rome session were the United States, Great Britain, British Colonial and Dependent Territories, Ceylon, France, Indonesia, Italy, Vietnam and the Netherlands. The next session of the study group will be held in Canada, the organization decided, on a date and place to be decided by the Canadian Government and the Management Committee.

**NATURAL RUBBER PRODUCTION IN 1951**

| | |
|---|---|
| Malaya | 695,000 |
| Indonesia | 700,000 |
| Ceylon | 110,000 |
| Vietnam and Cambodia | 48,000 |
| Thailand | 110,000 |
| British Borneo | 82,000 |
| Burma | 11,000 |
| Liberia | 33,000 |
| Belgian Africa | 13,000 |
| British Africa | 14,000 |
| French Africa | 2,000 |
| Other countries combined | 52,000 |
| Total | 1,870,000 |

**SYNTHETIC RUBBER PRODUCTION IN 1951**

| | |
|---|---|
| United States | 844,000 |
| Canada | 68,000 |
| West Germany | 3,000 |
| Total | 915,000 |

**RUBBER CONSUMPTION ESTIMATES FOR 1951**

| | Natural | Synthetic | Total |
|---|---|---|---|
| United States | 440,000 | 830,000 | 1,270,000 |
| United Kingdom | 229,000 | 4,000 | 233,000 |
| Belgium | 15,000 | 1,000 | 16,000 |
| Denmark | 5,000 | Small amt. | 5,000 |
| France | 120,000 | 12,000 | 132,000 |
| West Germany | 84,000 | 6,000 | 90,000 |
| Italy | 49,000 | 7,000 | 56,000 |
| Netherlands | 17,000 | 1,000 | 18,000 |
| Australia | 35,000 | Small amt. | 35,000 |
| Canada | 44,000 | 31,000 | 75,000 |
| Other countries combined | 492,000 | 3,000 | 495,000 |
| Total | 1,530,000 | 895,000 | 2,425,000 |

### U. S. Rubber Expanded Royalite

U. S. Rubber Co., New York, N. Y., has announced the development of a new expanded plastic for use in making life rafts, life ring buoys, and other floatation equipment. Known as "Expanded Royalite," the product is honeycombed with millions of tiny non-connecting cells which make it extremely light. It is strong, not affected by sun or salt water, and will stay afloat indefinitely. In addition to having excellent flotation qualities, Expanded Royalite is also an excellent thermal insulator, the company states. It is also said to have unusual dielectric properties. It is manufactured in flat sheets which can be formed by conventional thermoplastic forming techniques or it can be molded to shape. The density of the material can be varied for the application desired from 5 pounds per cubic foot to 35 pounds per cubic foot. Standard sheets available are 46 by 70 inches in one-quarter, one-half three-quarter and one inch thicknesses.

### Tire Testing Program Cited

The government's tire testing program has been under discussion by the House Appropriations sub-committee, which has been considering an allocation of funds for the General Services Administration which has conducted the tests. The work is going on under GSA direction by the U. S. Bureau of Standards. Congressmen were inquiring as to the necessity of the program since tire manufacturers maintain constant tests over their products. W. S. McLeod, director of the Standards Division of GSA, defended the project. "As a single buyer of about $20,000,000 worth of tires a year, it becomes paramount for us to know precisely the quality and serviceability of the tires we are getting," he told the subcommittee. He also stated that to date "the serviceability of the tires we now buy varies from contract to contract by about 30%."

### Goodrich Develops New De-Icer

A new version of the electric heating pad is now being used to keep ice from forming on wings and other vital surfaces of latest model military jet aircraft. The B. F. Goodrich Co. has developed a rubber, mat-like heating pad which can be attached to the leading edge of wings or other surfaces. Tiny resistance wires are imbedded in the pad and connected with a plug connector to a generator field. At the flip of a switch, the wires heat up as in an electric toaster and the heat is transmitted to all parts of the surface covered by the pad. Goodrich, manufacturer of all de-icers used on U. S. bomber aircraft in World War II, says that heating pads for airplane exterior surfaces can be made in any shape or size to fit such parts as antenna masts, propellors, air scoops, spinner domes and cowl rings.

Schutte and Koerting Co., on the occasion of their 75th Anniversary, have announced the consolidation of general offices and manufacturing facilities in one location in an enlarged modern plant at Cornwall Heights, Bucks County, Penna.

## CANADIAN HIGH POLYMER FORUM ANNOUNCES TENTATIVE PROGRAM

The tentative program of the 3rd Canadian High Polymer Forum has now been released. The Forum is to be held on Thursday and Friday, May 24 and 25 at the Royal Military College in Kingston, Ont. Sponsored by the Chemical Institute of Canada, this Forum also has the support of the National Research Council of Canada. The guest evening speaker is Dr. H. M. Spurlin of Hercules Powder Company, Wilmington, who will speak on "Polymer Solutions." The program of papers is:

Influence of Solvents upon the Uncatalyzed Reaction between Resorcinol and Formaldehyde, by R. A. V. Raff, Mellon Institute of Industrial Research, University of Pittsburgh.

Low Temperature Physical Properties of High Polymers, by G. Ivey, University of Toronto.

Particle Motion in Suspensions of Model Particles, by S. G. Mason and B. J. Travelvan, Pulp & Paper Research Institute, Montreal.

The Non-Stationary State in Polymerization Kinetics, by T. G. Majury, Birmingham University, England.

A Study of the Role of Enediols in Low Temperature Polymerization, by R. Orr and H. L. Williams, Polymer Corporation Limited, Sarnia.

Diffusion Studies with Radioactive Polymer, by C. A. Winkler, McGill University.

Sedimentation and Diffusion Studies on Polysaccharides, by W. H. Cook, National Research Council, Ottawa.

Interactions of Synthetic Polyelectrolytes with Proteins, by H. Morawetz, Harvard University, Boston.

The Polymerization of Styrene Photosensitized by Diacetyl, by D. J. LeRoy, University of Toronto.

The Crystallization of High Polymers, by D. A. Henderson and N. R. Legge, Polymer Corporation, Sarnia.

The Photochemistry of Proteins, by R. Roberts, Royal Institution, London, England.

Thixotropic Breakdown in Concentrated Solutions as a Measure of Non-Linearity of High Polyer Molecules, by L. H. Cragg and R. H. Sones, McMaster University, Hamilton.

Attempts at the Measurement of the Solubilities of High Molecular Weight Mercaptans, by W. E. Harris, University of Alberta.

Structure Comparisons of Synthetic Polypeptides and Wheat Protein by Means of Infra-Red Spectroscopy, by E. Y. Spencer and L. Wiseblatt, University of Saskatchewan.

Variation of the Diffusion Coefficient with Temperature for the Interdiffusion of Acetone and Polyvinyl Acetate, by A. T. Hutcheon and J. T. Kelly, McMaster University.

Electro-osmosis and Streaming Potential in Living Plants through Cellular-Protein Channels, by D. S. Fensom, Ridley College, St. Catharines.

Synthesis of Polypeptides, by R. V. V. Nicholls, McGill University.

The Application of Paper Chromatography in the Study of Protein Separations and Reactions, by J. H. Quastel, Montreal General Hospital Research Institute.

Methoxyl Groups in a Superficially Methylated Cotton Cellulose, by D. F. Manchester and C. B. Purves, McGill University.

## GENERAL TIRE FORMS CHEMICAL DIVISION WITH M. G. O'NEIL AS HEAD

M. G. O'Neil

E. V. Osberg

G. S. Schaffel

General Tire & Rubber Co. of Akron, Ohio, has formed a Chemical Division to manufacture and sell chemicals, synthetic rubbers and related products. The formation of the Chemical Division follows the company's entry last year into the plastic film field with a full-scale operation at its plant in Jeannette, Penna. The new division falls under the jurisdiction of M. G. O'Neil, who was recently appointed executive assistant to the president of the company. The Chemical Division will utilize the research facilities of General Tire's laboratories at Akron; Wabash, Ind.; Azusa, Calif., and Jeannette.

Edward V. Osberg, who has been associated with the rubber, plastics and chemical industries for the past 20 years, has been named assistant manager of the new division. He will be responsible for coordinating all sales, manufacturing and technical activities. Dr. G. S. Schaffel, formerly director of the company's plastics research, has been named manager of manufacturing for the division. All plant operations and new plant construction will be under his direction.

The primary function of the new division will be to carry through to large-scale commercial operations the many developments of the Chemical Research Division, which is headed by Gilbert H. Swart. Emphasis has been placed on high polymer chemistry, using new as well as standard chemicals as monomers for producing new synthetic rubbers and plastics.

### Ammonium Bicarbonate Available

Chemical Manufacturing Co., with offices at 21 West St., New York 6, N. Y., and 369 Pine St., San Francisco 4, Calif., has announced the availability of a technical grade of ammonium bicarbonate which has an average ammonia ($NH_3$) content of 21.6%. The bicarbonate, a product of Imperial Chemical Industries, Ltd., of England, is a fine, white crystalline material. The material finds use in rubber manufacture as a blowing agent. It is available in 244 pound drums.

### Triple Cities Builds Warehouse

Triple Cities Rubber Co., Inc. of Binghamton, N. Y., has announced the completion of a 20,000 square foot warehouse located on the main line of the Erie Railroad. The one-story building has a siding built to accommodate ten cars. Triple Cities processes scrap rubber for the reclaiming industry.

### Expands Rubber Research Unit

Monsanto Chemical Co. has announced a substantial expansion of research facilities at its Rubber Service Department at Nitro, W. Va. The research building is part of a major expansion program for the Organic Chemicals Division, company officials stated. The new research facility will provide the Nitro plant with an air-conditioned, two-story, brick and steel structure. The building will house laboratories, conference rooms, offices and improved library and storage facilities in the field of rubber and agricultural chemicals, oil additives and synthetic detergents. Approximately 80 persons will be employed in the research building. Construction of this new unit is expected to begin shortly, with completion scheduled for the spring of 1952.

### Marks Output of Billionth Pound

The government-owned synthetic rubber plant at Port Neches, Texas, operated by the B. F. Goodrich Chemical Co., recently produced its one-billionth pound of synthetic rubber. The plant, with a rated capacity of 60,000 long tons per year, produced its first pound on August 18, 1943. It continued in production after World War II when most other government rubber plants were put on a standby basis. The plant has also established an enviable safety record in its eight years of operation.

## NPA ANNOUNCES ESTABLISHMENT OF "CMP" ALLOTMENTS ON JULY 1

Beginning with the third quarter of the year, effective July 1, 1951, the Controlled Materials Plan will go into effect, the National Production Authority announced recently. Under this plan, defense and defense supporting production and construction will be programmed and essential materials made available, using the same common denominators as in World War II—steel, copper and aluminum.

As in World War II, products programmed under CMP fall into two categories: "A" products and "B" products. The former group can be defined as custom-built, special-purpose products manufactured specifically for defense. This includes tanks and guns, merchant ships, special-purpose machine tools and the like. "A" product manufacturers receive their allotments directly from the procurement agency concerned, and pass percentages of them on to their subcontractors.

The "B" product list includes certain products where it is most practical to furnish authorizations horizontally, directly to the producer. In general, this list includes certain civilian-type products, industrial machinery and equipment, and components which are needed for defense. Producers on the "B" list will obtain their authorizations and allotment from their NPA Industry Division.

In order to get the program under way, NPA issued its "Class B Product List" of items which it considers "essential." NPA has also sent to the some 50,000 manufacturers of these items a four-page form, CMP-4B, for information needed to provide the allocations. Products definitely slated to get allocations will have to be selected by the requirements committee run by the Defense Production Administration but representing the military and other government agencies. New products will be selected from the "essential" list continually for direct allocations, as their problems become more critical.

Some of the items which the NPA deems essential and which should stand a good chance of getting direct allocations of the three scarce materials in the third quarter include tires and tubes, rubber and plastic-working machinery, high frequency induction and dielectric heaters, and laboratory instruments.

### Du Bois Latex-Lube Pigmented

Du Bois Co., Cincinnati, Ohio, has announced an interesting addition to the family of Latex-Lube and Liqui-Lube immersion materials for preventing stock adhesion. The new product, known as Latex-Lube Pigmented, is described as a heavily pigmented stock spray or dip to prevent sticking. It exists in a conveniently fluid state, instantly dilutable with water, yet is said to be more concentrated than former paste or solid type products. The adhesion-preventing coating laid down on the stock by Latex-Lube Pigmented is translucently gray, non-dusty, adaptable to cold flowing stocks, and entirely compatible with rubber and synthetics, the company states.

### Back Issues Wanted

Finished with your January or February, 1951, issues of RUBBER AGE? High demand for these issues has depleted our supply. As a result, our Circulation Manager will pay 35c for each issue (in good condition) delivered or mailed to our offices. Just address the Circulation Manager, RUBBER AGE, 250 West 57th St., New York 19, N. Y.

## OFFICE OF PRICE STABILIZATION SETS MANUFACTURER'S CEILINGS

The Office of Price Stabilization has issued Ceiling Price Regulation *22*, dated April 25, 1951, setting ceiling prices for many manufactured products at a pre-Korean base plus actual increases in material costs through 1950 and increases in factory payroll costs through March 15, 1951.

According to the order, the base period is April 1 through June 24, 1950, or any one of the three preceding calendar quarters selected by the seller. Ceiling price is the highest base period price of a commodity, with adjustments for factory payroll and material cost increases. Sales terms must be wholly consistent with base period delivery terms, differentials for purchaser classes, discounts, premiums and other conditions.

CPR *22* applies to sales by all manufacturers in the continental United States, including exporters, except sales at retail and sales of commodities specifically exempted. Manufacturers with last year fiscal year gross sales under $250,000 have the option of using CPR *22* or GCPR. Provisions of CPR *22* cover most chemicals, many textile products, tires and rubber products, hardware, etc. In addition, OPS will soon issue three similar regulations to control manufacturers' prices for machinery, cotton textiles, and apparel and shoes.

CPR *22* does not apply to sales by manufacturers of a number of commodities including crude and synthetic rubber, synthetic textile fibers and yarns, most fats and oils, ethyl and butyl alcohol, and other chemicals. OPS believes that the new regulation will serve to restore more normal cost-price relationships.

### Kendall Opens Research Laboratory

The Kendall Co., manufacturers of surgical dressings, cotton textiles, and allied products, recently opened its new Theodore Clark Laboratory at Cambridge, Mass. The laboratory, named in honor of the late Mr. Clark, a chemist and former vice-president of the company, will conduct pioneering research in the field of high polymers, both in basic research and on specific company problems. It will be under the direction of Willard M. Bright. Bauer & Black is a division of the Kendall Co.

## URW POLICY COMMITTEE DRAFTS REQUEST FOR SALARY INCREASES

The Policy Committee of the United Rubber Workers, C.I.O., meeting at the Hotel Detroiter in Detroit, Mich., on May 2, drafted a nine-point program of demands to be made on the rubber industry which was unanimously approved by the General Executive Board. The proposals would affect some 200,000 union members throughout the United States.

The union asserted the mobilization program had "failed to stabilize our economy." Prices have spiraled so rapidly that wage increases won in 1950 have been wiped out, the committee said, adding that "corporate profits have been permitted to attain unparalleled peaks." The nine-point program asked by the union includes:

(1) A substantial wage increase. "This increase is justified on the basis of increased living costs, fabulous and unprecedented profits by the rubber and allied industries and the increase in man-hour productivity."

(2) Extension and improvement of pension, insurance, surgical, medical and hospitalization programs.

(3) Continuation of efforts to obtain full union shop contracts.

(4) Correction of intra-plant, inter-plant and area inequalities and inequities.

(5) Improvement of night shift bonus, holiday pay and vacation programs and other fringe benefits.

(6) That a meeting be called of the Canadian section of the international policy committee for the purpose of formulating an economic program consistent with this policy.

(7) Obtain adequate contract provisions to prevent speedup of operations; to prevent rate reductions; and to insure reasonable and uniform work loads.

(8) Contract provisions providing for the right to reopen wages for negotiations at any time upon notice of 30 days or less with the right to cancel the agreement if the wage demand is unsettled.

(9) Improved benefits for employes entering the armed services and their dependents.

### Hercules Powder Honors Dunham

Russell H. Dunham, first president and first chairman of the board of the Hercules Powder Co., Wilmington, Del., was honored in special ceremonies at Wilmington on April for his leadership in the creation of the company's research laboratories in 1930. The ceremonies took place at a luncheon at the Hercules Country Club and marked the 20th anniversary of the opening of the Hercules Experimental Station. Dr. Emil Ott, director of research, presided over the ceremonies. Mr. Dunham was presented with a group of three photographs as a memento of the opening of the Experiment station.

A new motion picture, "A Professional Portrait," designed to increase transportation efficiency through a better, safer use of streets and highways by commercial vehicle drivers, has just been released by the Automobile Manufacturers Association.

## GOODRICH CITES DEFENSE NEEDS IN COMPUTING 1951 RUBBER USE

Next time you see a B-36 bomber winging through the sky you are looking at more than two and one-half tons of rubber flying overhead. Over 500 pounds of rubber are needed to keep a five-ton army truck rolling while rubber used on the popular army jeep tips the scales around 90 pounds. A single, 12-man rubber life raft takes 100 pounds of rubber while latest type inflatable bridge pontons used by the Engineer Corps need over 200 pounds.

The B. F. Goodrich Co. is citing these facts to illustrate the eventual end products which this year's rubber industry production for defense will include. The rubber industry may set an all-time record in 1951 by processing an estimated 1,260,000 tons of synthetic and natural rubbers for military and essential civilian uses.

In a normal year, the rubber supply is reported to be divided as follows: Tires takes 53.6 per cent; inner tubes, 8.0 per cent; camelback, tire sundries and repair materials, 5.2 per cent; rubber footwear, 1.7 per cent; rubber heels and soles, 3.2 per cent; industrial rubber goods, belting, flooring and matting, 10 per cent; coated fabrics and clothing, .9 per cent; insulated wire and cable, 3.1 per cent; latex foam, 2.8 per cent; drug sundries, 1 per cent; balls and toys, 1.4 per cent; other rubber products, 9.1 per cent.

In 1950, it took over 200 pounds of rubber to make the average passenger car. This means about 600,000 tons of rubber went into automobile manufacture last year. Nearly 80,000,000 pounds of rubber are made into garden hose in a typical postwar year. The same amount goes each year just to put heels and soles on American shoes. Fire hose takes another 10,000,000 pounds. Rubber bands take nearly 4,000,000 pounds while erasers take nearly 2,000,000 pounds. Over 10,000,000 pounds of rubber go into rubber thread for such products as girdles and golf balls. More than 56,000,000 pounds of rubber are used in the manufacture of conveyor and elevator belting used in the nation's mines, quarries and general industry.

Destined each year for the manufacture of common rubber products used in the home is enough rubber for 6,000,000 water bottles; over 140,000,000 nipples and pacifiers; over 1,200,000 ice bags and caps; over 7,000,000 pairs of household rubber gloves, and nearly 34,000,000 rubber baby pants.

## NEW POLYMERS AUTHORIZED BY OFFICE OF RUBBER RESERVE

Listed below are types and properties of new experimental GR-S polymers (including GR-S latices) which have been authorized by the Office of Rubber Reserve, Reconstruction Finance Corporation, since publication of those in our previous issue. Procedures for the distribution and sale of these polymers will be found in our October, 1945, issue. Normally, experimental polymers will be produced only at the request of the consumers and 20 bales (one bale weighs approximately 75 pounds) of the original run will be set aside if possible for distribution to other interested companies for their evaluation. The 20 bales when available will be distributed in quantities of one or two bales upon request of the Sales Division of Rubber Reserve or will be held for six months after the experimental polymer was produced unless otherwise consigned before that time. Subsequent production runs will be made if sufficient requests are received to warrant them.

| *X No.* | *Polymer Description* |
|---|---|
| X-634 GR-S | Butadiene/styrene charge ratio 75/25 adjusted to give 20 ± 1% bound styrene, polymerized at 41°F; emulsified with Dresinate 214 or 731; catalyzed with diisopropylbenzene hydroperoxide or equivalent; iron-pyrophosphate activator. Shortstopped with DNCB; stabilized with 1.25% BLE. Mooney viscosity 52 ± 6. |
| X-635 GR-S Latex | Same as X-633-GR-S latex except butadiene/styrene charge ratio 70/30; solids content 60.0-63.0%; Mooney viscosity of contained polymer (ML-4 @ 212°F) 70-110. |
| X-636 GR-S | Same as X-597 masterbatch except bound styrene content of the non-pigmented polymer is 20 ± 1%. |
| X-637 GR-S | Butadiene/styrene charge ratio 75/25 adjusted to give 20 ± 1% bound styrene; polymerized at 41°F. emulsified with Dresinate 214 or 731; catalyzed with diisopropylbenzene hydroperoxide or equivalent; iron-pyrophosphate activator. Shortstopped with sodium dimethyl dithiocarbamate and sulfur as sodium polysulfide. Stabilized with 1.25% Stalite. Mooney viscosity 52 ± 6. |
| X-638 GR-S | A masterbatch of 15 parts Philblack 0 and 100 parts of the non-pigmented polybutadiene in X-584. |
| X-639 GR-S | Same as GR-S 26 except butadiene-styrene charge ratio adjusted to give 20 ± 1% bound styrene. |
| X-640 GR-S | Same as GR-S 60 except butadiene-styrene charge ratio adjusted to give 20 ± 1% bound styrene; shortstopped with sodium dimethyl dithiocarbamate and sulfur as sodium polysulfide, and stabilized with 1.25% Wingstay-S. |
| X-641 GR-S | Same as GR-S 10 except activated with Redsol. |
| | *Please Note Changes Made in the Following Experimental Polymers* |
| X-431 GR-S | Stabilizer changed to read 1.25 parts Wingstay-S. |
| X-618 GR-S | Polymerization temperature 46° to 50°F. |

NOTE: The above new polymers are experimental only and the Office of Rubber Reserve, Reconstruction Finance Corporation, does not make any representation or warranties of any kind, express or implied, as to the specifications or properties of such experimental polymers, or the results to be obtained from their use.

### Named Rubber Division Treasurer

Amos W. Oakleaf, sales manager of the Philblack Division of the Phillips Chemical Co., Akron, Ohio, has been elected treasurer of the Division of Rubber Chemistry of the American Chemical Society succeeding C. W. Christensen, sales manager of the Rubber Service Department of the Monsanto Chemical Co. at Akron. Mr. Christensen had held the position since 1934, but had recently asked to be relieved. Mr. Oakleaf was formerly assistant treasurer of the division.

### Building New Seattle Plant

Huntington Rubber Mills, Inc. of Seattle, Wash., has announced plans to build a new $125,000 plant south of Seattle for the manufacture of rubber products. The present Seattle factory, now located at 35 W. Lander St., will be moved to the new location as soon as the one-story concrete plant is finished. Construction on the plant was scheduled to begin immediately.

### Nelson Employment Moves Office

The Nelson Employment Service, of which Harold Nelson is manager, has moved its headquarters from the Buckeye Building to the First National Tower Building in Akron, Ohio. The new quarters afford considerable more space for the growing business of the concern. Nelson Employment Service specializes in rubber personnel for all branches of the industry.

# NAMES IN THE NEWS

W. GLEED COE, one-time production manager of RUBBER AGE and associated with the U. S. Rubber Co. for the past ten years in various supervisional capacities, has joined the Autograf Brush & Plastics Co., Inc., Watervliet, N. Y., as vice-president in charge of manufacturing.

KENNETH C. CROUSE has been appointed administrative assistant to the vice-president in charge of the Industrial Products Department of the J. M. Huber Corp., New York, N. Y.

RICHARD C. NOEL and MORTIMER HAYS have been elected directors of the Circle Wire & Cable Corp. Mr. Noel is an investment banker while Mr. Hays is an attorney.

CHARLES E. JONES, vice-president and comptroller of the Seiberling Rubber Co., has been elected a director of the company succeeding J. L. COCHRUN, who recently retired as executive vice-president and director.

JOHN R. GARRASON, for many years western manager for the E. W. Colledge Co. with headquarters in Chicago, has been promoted to assistant sales manager with headquarters at the general offices in Jacksonville, Florida.

JOHN E. BROTHERS, of the Ohio Rubber Co., Willoughby, Ohio, was recently elected chairman of the Northeastern Ohio Section of the American Chemical Society. He was chairman of the program committee of the section last year.

H. S. REID, vice-president and a director of Shawinigan Chemicals, Ltd., was recently appointed executive vice-president of the company. E. R. WILLIAMS, works manager, has been elected vice-president in charge of manufacture.

DR. GEOFFREY GEE, director of research of the British Rubber Producers' Research Association, was recently elected a Fellow of the British Royal Society.

NORMAN A. KLEMP, until recently associated with the Roth Rubber Co. at Chicago, Ill., has joined the Rubber Division of the Standard Products Co., Cleveland, Ohio, as research director.

T. REDMOND THAYER has been appointed manager of high tenacity rayon yarn sales for the American Enka Corp.

W. H. DEBRUIN, for the past five years engaged in farm tire development for the Goodyear Tire & Rubber Co. at Akron, has been named resident contact engineer for the company in Detroit, Mich. T. J. THADEN, for the past three years engaged in tractor tire design for the company, has been named to succeed Mr. DeBruin.

JOSEPH H. REID, manager of the Titanium Division of the National Lead Co., has been elected a vice-president of the company. He is also a director of the Titanium Pigment Corp.

E. D. RANDALL has been appointed purchasing agent of the Pantasote Co., Passaic, N. J.

LESTER H. SWANLUND has been elected treasurer and a director of the Brunswick-Balke-Collender Co. succeeding the late W. T. STERLING who previously had served as treasurer.

DOUGLAS G. PARIZEAU, associated with the Baker Castor Oil Co. since 1950, has been appointed a sales representative of the company covering the states of Minnesota, Wisconsin, Illinois and Indiana.

ROBERT D. LAWSON, formerly Chicago district manager of the Grinding Machine Division of the Norton Co., Worcester, Mass., has been named sales manager of the division succeeding C. DENSON DAY, who recently resigned to accept a position as vice-president with Machinery Associates, Inc. of Philadelphia, Penna.

ARTHUR M. COLE has been named manager of the section of the Planning Division of the Polychemicals Department of E. I. du Pont de Nemours & Co., Inc., which handles sales to the rubber, adhesives and wood industries.

THOMAS W. SMITH, JR., president of the Sun Rubber Co., has been named a trustee of the Akron Art Institute, Akron, Ohio.

FRANCIS J. VERDUIN, formerly sales representative for the Pigment Department of the Calco Chemical Division, American Cyanamid Co., has been transferred to the St. Louis territory.

DENNIS E. TIBERIUS, vice-president of the Hill Diesel Engine Corp. of Lansing, Mich., a subsidiary of the Drake America Corp. of New York, has been elected a vice-president of the parent company.

D. R. G. PALMER, associated with the General Cable Corp. since 1919, and president of the firm since 1933, has been elected chairman of the board and chief executive officer of the company. J. R. MACDONALD, associated with General Cable since 1940, and formerly first vice-president, has been elected president of the company succeeding Mr. Palmer.

S. P. JACOBSON, recently appointed vice-president in charge of manufacturing for the Brunswick-Balke-Collender Co., has been named a director of the company.

ROBERT J. STACK, formerly executive vice-president of National Automotive Fibres, Inc., Detroit, Mich., has been appointed president of the company succeeding J. R. MILLAR, who will continue as chairman of the board.

JONAS R. SMITH, former manager of the Eureka Fire Hose Division of the U. S. Rubber Co. in the Philadelphia, Penna., territory, has been named sales manager of the division succeeding JOSEPH H. GREEN, who recently retired after more than 46 years with the company.

DR. CHARLES ALLEN THOMAS, formerly executive vice-president of the Monsanto Chemical Co., and one of the nation's leading atomic scientists, has been elected president of the company succeeding WILLIAM M. RAND, who recently resigned.

COLIN M. STEWART, since 1945 general manager of Compania Goodrich Cubana in Havana, Cuba, has been appointed to the Automotive, Aviation, and Government Sales Division of the parent B. F. Goodrich Co. in Detroit, Mich.

E. T. ASPLUNDH, associated with chemical operations of the Pittsburgh Plate Glass Co. since 1919, has been named president of the Southern Alkali Corp., a wholly-owned subsidiary of the company.

THOMAS F. O'NEIL, vice president and a director of the General Tire & Rubber Co., and vice-president and a director of the Don Lee-Yankee Networks, has been elected chairman of the board of the Mutual Broadcasting System, Inc., New York, N. Y.

EDMUND F. BALL, president of Ball Brothers Co., Muncie, Ind., has been elected to the board of directors of the Borg-Warner Co., Chicago, Ill.

MORSE G. DIAL, formerly vice-president, treasurer and a director of the Union Carbide & Carbon Corp., has been elected executive vice-president of the company. DR. GEORGE O. CURME, JR., formerly vice-president in charge of chemical research for the company, has been named vice-president in charge of all research activities.

DR. O. R. BRUNKOW, formerly general sales manager of the Commercial Solvents Corp., New York, N. Y., has been named sales manager of the Hardesty Chemical Co., also of New York.

EDWARD O. DENZLER, formerly associated with the Acushnet Process Co. and FRANK HILL, formerly associated with the Union Bag and Paper Corp., have joined the research and development staff of Texon, Inc., South Hadley Falls, Mass.

J. W. ROBERTS, previously chief works accountant in charge of domestic manufacturing operations for the Goodyear Tire & Rubber Co., has been elected assistant comptroller of the company in charge of factory accounting for all Goodyear plants in the United States.

## TECHNICAL AND SOCIAL MEETINGS HELD BY QUEBEC GROUP IN MARCH

The Quebec Rubber and Plastics Group held its annual dance on March 2 in Victoria Hall, Westmount, Quebec, Canada, with approximately 230 members and guests in attendance. A number of valuable and useful gifts were distributed as door prizes. Refreshments were served midway through the dance.

On March 29, the group met at the Queen's Hotel in Montreal with Dr. W. R. Smith, chief research chemist of Godfrey L. Cabot, Inc., as guest speaker. Dr. Smith spoke on "The Behavior of Carbon Black in Rubber and Plastics." An excellent film outlining the various methods of manufacture of carbon black was also shown to the group.

In his address, Dr. Smith pointed out that while the effectiveness of carbon black in increasing the service life of rubber goods had long been recognized, the effects of carbon black in plastics at loadings comparable to those used in tire treads had not been as fully studied. However, during the past two years, experiments had been carried out on a number of plastics, among them polythene, polystyrene and polyvinyl chloride. A range of carbon blacks at 30-50 parts loading have been studied and the general results have been the same in all instances. In general, the stiffness and softening points of the compound plastics are greatly increased, and the impact strength considerably reduced.

The remarkable reinforcing effect which carbon black displays in elastomers is not in evidence in plastics. Using molecular models, Dr. Smith demonstrated that this result was not unexpected. Since the effectiveness of carbon black undoubtedly involves some type of cross linking or association between high polymer chains, it can be readily seen that these effects will be most pronounced in elastomers where the forces between polymer chains are relatively weak and the cross links few in number. In plastics, the intermolecular forces are already very intense; so much so that plasticizers are commonly employed to overcome them. Obviously then, in plastics the addition of further cross links and additional restricting forces have little effect upon physical properties, he said.

In concluding, Dr. Smith pointed out that at loadings of from 2 to 5%, carbon black was able to improve the weather aging properties of most plastics manyfold. The effectiveness of carbon black in this regard probably involves two factors: the ability of carbon black to decompose peroxides and to screen the plastic from ultra-violet. Although these effects have been generally overlooked in carbon black-rubber systems, they may prove to be significant factors in defining the reinforcing ability of carbon black.

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In a move to aid and promote tire conservation, the Socony-Vacuum Oil Co. has released a motion picture entitled "Save a Tire, Save a Customer," which shows service station operators and attendants how to assist motorists in tire care.

## Long-Lasting Cutting Block

The "Cut Rite Bloc", a new, long-lasting cutting block that contains Hycar rubber, has been especially designed for cutting leather, rubber, cloth, canvas, cork, plastics, copper, aluminum, fiber and paper products. Custom supplied in various sizes by the manufacturer, the Rubber Engineering and Chemical Co. of Lake Zurich, Ill., the product's durable surface

is said to stand up under the constant hard usage of the cutting room. Outstanding features of the new product include its provision of fast and economic cutting operation, extra cutting efficiency and lower costs. Cutting noise is also noticeably reduced and there is no soiling by sawdust or discoloration of the materials being cut. Cutting dies are said to remain sharp for long periods and do not break. The Hycar component is said to give the block its exceptional resistance to oil and grease and to provide it with great impact strength and durability.

## Chicago Group Elects Officers

Approximately 150 members and guests of the Chicago Rubber Group attended the April 20th meeting held at the Morrison Hotel in Chicago, Ill. The meeting consisted of a "Ladies Night," and featured the announcement of officers for the 1951-52 season as selected in a letter ballot. Officers elected are: *Chairman*, Frank Taylor (Commercial Solvents); *Vice-Chairman*, Herman Boxser (Acadia Synthetic); *Secretary*, A. J. Hawkins (DuPont); *Treasurer*, A. G. Susie Armour Research). The following members were elected to the Executive Committee for a one-year term: Robert O. Hartman (Monsanto); Albert E. Lawrence (Phillips Chemical); John C. Gallagher (Allis Rubber); L. W. Heide (Acadia Synthetic). The following members were elected for a two-year term: Howard E. Anderson (Goodrich Chemical); Ralph F. Anschuetz (Witco); John Groot (Dryden Rubber); Vincent J. LaBrecque (Victor Mfg.). The Nominating Committee consisted of L. W. Heide, Edward Meyer (Herron & Meyer), Francis Frost (Frost Rubber), Bruce W. Hubbard (Ideal Roller), and Howard E. Anderson (Goodrich Chemical). The assembled members and guests enjoyed a program of entertainment at the meeting.

## BUFFALO GROUP HEARS CASHION SPEAK ON NITRILE RUBBER USE

The April 10th meeting of the Buffalo Rubber Group, held at the Hotel Westbrook in Buffalo, N.Y., featured an address by G. C. Cashion, sales engineer of the Xylos Rubber Co., Akron, Ohio. Mr. Cashion spoke on "Why Use Nitrile Rubber." The meeting was also addressed by Robert Quirk of the Buffalo Police Laboratory who spoke on "Scientific Aids in Modern Criminal Investigation."

In his address, Mr. Cashion stated that during the last ten years nitrile rubbers have come into the picture and are offering design possibilities heretofore not possible with any previously known elastomer. Growing from their primary war time applications in fuel cells and hydraulic landing gear "O" rings, nitrile rubber parts can be found today in hundreds of applications where their properties make them the most desirable material to use. Some of the properties which make them desirable from an engineering point of view include the following:

(1) Resistance to swell in aniline point oils; (2) Resistance to swell in fuels, especially aromatics; (3) Resistance to temperatures of 300° F. to —70° F.; (4) Resistance to abrasion; (5) Resistance to compression set and stress relaxation; (6) Can be made conductive or resistive; (7) Resists many chemicals better than other rubbers; (8) Can be made to any durometer hardness; (9) Can be made as sponge —hard or soft; (10) Can be bonded to metal, fabric and graphite.

The automotive industry using the well known D-735 low swell SB series of nitrile compounds has advanced the use of these rubbers tremendously. In addition, we find other machine industries using these same types of stock, he said. Based primarily on the AMS hot oil resistant stocks the hydraulic transmission parts made of nitrile can be said to make these drives a possibility. In the automotive industry also, coolant system parts have turned to some extent to nitrile rubber.

Rolls for the graphic arts and roller coating industries are another new use for nitriles. Powerful solvents necessitated this application in these industries. Milking machine parts, food industry machines, etc., are making use of the oil resistance of nitriles. In the field of electrical oil resistant parts, both conductive and high resistive, nitrile parts are possible.

In the sponge field, oil and heat resistant sponge, both hard and soft, are finding new industrial applications. Hard rubbers and semi-hard rubbers of the Butaprene type are finding new applications daily. The hard rubbers possess extreme heat resistance compared to natural hard rubber. In the case of the semi-hard types, the impact resistance is the basic property, Mr. Cashion concluded.

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American Rubberizing Co., 617 11th Avenue South, Minneapolis 4, Minn., has made available a new four-page bulletin describing the processing of canvas and cotton knit gloves with natural rubber, neoprene or plastics.

# FINANCIAL NEWS

### Dewey & Almy Chemical Co.

First Quarter: Net profit of $414,746 on net sales of $7,125,801, compared with $214,071 on net sales of $3,908,382 for the first quarter of 1950. The directors also voted to file a registration statement on May 8 with the Securities and Exchange Commission covering 200,000 shares of common stock for public sale about June 1. Proceeds from the sale would be used to provide for further growth and to continue to maintain a strong financial position as well as to retire the $1,100,000 of notes issued in 1949.

### I. B. Kleinert Rubber Co.

For 1950: Net income of $491,053, which is equal to $3.11 a share, compared with $304,087, or $1.91 a share in the previous year. Net sales during 1950 totaled $8,961,604, against $8,765,407 in 1949. Working capital as of December 31, 1950, totaled $3,301,520, an increase of $239,527 over the previous year. Inventories at the end of 1950 increased to $3,017,993 from $2,158,465 at the end of 1949. The yearly statement excludes the earnings of an English branch.

### U. S. Rubber Co.

First Quarter: Net profit of $9,076,755, which is equal to $4.41 a share, compared with $3,927,375, or $1.49 a share, in the first quarter of 1950. Consolidated net sales for the first quarter of 1951 totaled $211,930,849, against $130,331,500 in the first quarter of the preceding year. The report listed federal and foreign income taxes of $23,289,241, contrasted with $3,032,549 in the March quarter of 1950.

### Eagle-Picher Co.

Quarter Ended February 28: Net income of $914,851, which is equal to $1.01 per share, compared with $131,370, or 15c a share in the first quarter of the preceding fiscal year. Net sales in the quarter ended February 28, 1951, totaled $21,597,511, against $12,433,000 for the quarter ending February 28, 1950.

### Allen Industries, Inc.

First Quarter: Net income of $344,484, which is equal to 61c each on 599,200 common shares, compared with $294,580, or 52c a share in the first quarter of 1950. Sales in the first quarter of 1951 reached a record of $10,951,000, up 49.1% from the $7,337,000 volume for the first quarter of the preceding year.

### Detroit Gasket & Mfg. Co.

For 1950: Net profit of $1,846,664 on net sales of $25,660,566, compared with $530,649, or $1.01 a share, on net sales of $18,794,962 in 1949. The figures include earnings of the company's wholly-owned subsidiaries.

### Circle Wire & Cable Corp.

First Quarter: Net income of $564,780, which is equal to 75c a common share. Net sales in the first quarter of 1951 amounted to $4,663,200. Comparisons with the first quarter of the preceding year are unavailable.

### Plymouth Rubber Co.

Year Ended November 30: Net profit of $926,486, which is equal to $1.07 a common share on sales of $14,653,280, compared with $246,892, or 27c a share, on sales of $11,236,934 in the previous fiscal year.

### Flintkote Co.

First Quarter: Net income of $1,407,821, which is equal to $1.06 a common share on net sales of $19,763,335, compared with $961,929, or 70c a share on sales of $14,090,305 in the first quarter of 1950.

### Jenkins Brothers

For 1950: Net profit of $652,581, which is equal to $4.97 a common share on net sales of $12,355,818, compared with $237,283, or $1.55 a share on net sales of $8,994,248 in the preceding year.

### Sheller Manufacturing Corp.

First Quarter: Net profit of $1,045,858, which is equal to 94c a share, on net sales of $12,432,201, compared with $943,463, or 85c a share, on sales of $8,945,103 in the first quarter of 1950.

### Whitney Blake Co.

For 1950: Net income of $410,800, which is equal to $2.05 a share on net sales of $6,927,377, compared with $44,160, or 22c a share, on net sales of $4,459,240 in 1949.

### Belden Manufacturing Co.

First Quarter: Net profit of $303,840, which is equal to 95c a share, compared with $323,185, or $1.01 a share in the first quarter of the previous year.

### General Cable Corp.

First Quarter: Net income of $1,251,490, compared with $307,961 in the first quarter of the preceding year.

### Brown Moves Sales Offices

Brown Co. has announced the removal of its general sales offices from 500 Fifth Avenue, New York, N. Y., to 150 Causeway Street, Boston 14, Mass. The company will maintain a regional sales office at 500 Fifth Avenue to handle the sale of Solka-Floc, the company's purified wood cellulose flock which finds use as a filler and as a processing aid.

### Appointed Rodic Vice-President

Donald F. Fraser, formerly sales manager of the Rodic Chemical and Rubber Corp., New Brunswick, N. J., has been named vice-president and general manager of the company. John S. Wade, previously factory manager, has been named sales manager succeeding Mr. Fraser. Raymond P. Lynch has been appointed production superintendent of the company. Born in Toronto, Ontario, Canada, Mr. Fraser is now an American citizen. He was graduated from the University of Toronto in 1934 with a B.A. degree in chemical engineering. From 1933 to 1937 he was associated with the Dunlop Tire & Rubber Goods Co., Ltd. In 1937 he joined the Rubber Laboratory of E. I. du Pont de Nemours & Co., Inc. at Wilmington, Del., where he remained until 1943 when he joined the Rubber Reserve Co. in Washington, D. C. In 1944, Mr. Fraser joined the Monroe Auto Equipment Co. at Monroe, Mich. Later, he was associated with the Queen City Tulatex Corp. at Burlington, Vt., and the New Milford Rubber Co., New Milford, N. J. He joined Rodic Chemical in 1949 as technical director and then assumed the position of sales manager. He is a member of the American Chemical Society and has contributed to the technical literature.

### Named Manager of Israel Plant

Harold W. Purviance has been named general manager of the new tire plant in Israel owned by the General Tire & Rubber Co., of Akron. Located on an eight-acre site in Petach Tikvah, nine miles from Tel Aviv, the new factory is scheduled to get into production late in 1951. It is designed to produce 80,000 to 100,000 tires the first year of production. A native of East St. Louis, Ill., Mr. Purviance, who studied international law at Washington University, recently left for Israel to set up organizational procedures for the new plant. Afterwards, he will return to the United States for the final shipments of machinery and material. Mr. Purviance has spent many years at various South American and European rubber plants. Recently, he did extensive work on the expansion program of General Tire's affiliate in Portugal. He also worked in the sales organization at the Portuguese plant.

### Goodyear to Operate Arsenal

Goodyear Tire & Rubber Co. is returning to one of its World War II roles as a producer of propellant charges for the U. S. armed forces. Under a recently signed agreement with the government, Goodyear will begin rehabilitation of and later will operate the Hoosier Unit of Indiana Arsenal located at Charlestown, Ind. This plant was operated by the company from 1940 to 1945 during which period there was a peak employment of 10,000 persons. Operations on a reduced scale have been continued by the government since that time. Output of explosive charges will be stepped up by Goodyear after the rehabilitation program has been completed.

## TARIFF COMMISSION REPORTS ON SYNTHETIC OUTPUT IN 1950

The U. S. Tariff Commission, in a report on synthetic rubbers issued recently, said that output of all types in 1950 reached a total of 1,166,000,000 pounds, an increase of 22.5% from the 952,000,000 pounds reported for the previous year. The value of synthetic rubbers sold last year amounted to $301,000,000 on sales of 1,239,000,000 pounds. This compares with $225,000,000 for 973,000,000 pounds in 1949, an increase of 33.8% in value and 27.3% in quantity.

The report, the first in a series giving preliminary statistics on production and sales of synthetic organic chemicals in 1950, gives statistics on the production and sales of elastomers by major types, including both government-owned and privately owned plants. Statistics on the following types were given: polybutadiene-styrene (GR-S or Buna S); polybutadiene-acrylonitrile (N); polychloroprene (GR-M or Neoprene); polyisobutylene-isoprene (GR-I or Butyl); and polyvinyl elastomers.

Production of cyclic elastomers in 1950, which consisted entirely of the polybutadiene-styrene type used chiefly in the manufacture of automobile tires, was 802,000,000 pounds, or 21.3% more than the 661,000,000 pounds reported for 1949. Sales in 1950 of this type elastomer amounted to 880,000,000 pounds, valued at $171,000,000. In 1950, as in previous years, polybutadiene-styrene was produced in much larger volume than all other types combined.

### *Acyclic Elastomer Production*

Production in 1950 of acyclic elastomers, consisting of polybutadiene-acrylonitrile, polyisobutylene-isoprene, polychloroprene, and polyvinyl types, was 364,000,000 pounds, an increase of 25.5% over the 290,000,000 pounds reported for 1949. Sales in 1950 amounted to 359,000,000 pounds valued at $131,000,000.

In 1950 the acyclic elastomer produced in the largest volume was polyisobutylene-isoprene which is used principally in the manufacture of inner tubes for automobile tires. Production of this elastomer in 1950 was 125,000,000 pounds and accounted for 34.4% of all acyclic elastomers. The preliminary statistics on production and sales of elastomers are over 95% complete, the Tariff Commission said. The complete statistics will be given in the Commission's final report which will be issued later.

### Goodyear Neolite for Luggage

Through the use of a special finish, Barash Coated Goods, Inc., 122 Fifth Avenue, New York 11, N. Y., has adapted Neolite, product of the Goodyear Tire & Rubber Co., to the manufacture of luggage, briefcases, shoulder-strap bags and men's belts. Neolite has previously been used in shoe soles and heels. Barash has sheets of Neolite in a variety of colors and thicknesses. Its special finish is said to give the product a leather-like appearance.

## *David C. Scott, Sr.*

Just as this issue was going to press word was received of the death of David C. Scott, Sr., president of Scott Testers, Inc., of Providence, R. I. Mr. Scott died at his home in Providence on May 12 after a long illness. He was 66 years old. Few men in the industry contributed so much to it in the past half-century, not only from the angle of testing equipment, with which he was associated all of his life, but from the standpoint of the welfare of the field. There were few functions at which Dave Scott was not present and to which he had not made some contribution in the form of personal services. He will be sorely missed in the future. Memorial services were to be held in Providence on May 17. A comprehensive obituary will be published in our next issue.

## BRAZILIAN GOVERNMENT PLANNING AID FOR DOMESTIC RUBBER CROP

Short and long-range programs to help Brazil boost its rubber supply have been worked out through the joint efforts of the Agricultural Ministry, the Northern Farming Institute, the Amazonia Credit Bank and planters and rubber goods manufacturers. The long-range program will include planting some seven million trees in the Amazon basin, including a million in Guaporé Territory by the Federal Government.

Private planters will set out around four million trees at selected Amazon basin sites, while rubber goods manufacturers, anxious to assure a steady supply, will plant two million on their own. The immediate program includes an allocation of 2.5 million cruzeiros by the Agricultural Ministry to step up latex gathering from trees now available for tapping. Rubber goods industrialists are expected to add another million cruzeiros to this sum.

The Amazonia Bank has also announced that it will set aside funds to help bring in enough workers to gather all available latex. There are about a million trees at the Belterra plantations in Amazonas which have gone untapped because of the labor shortage there, it was said. These trees could produce about 80 tons of latex monthly.

Tappers could also be sent out to work on wild trees if financial arrangements were made. Also, it was pointed out, there are about a million trees in the state of Bahia which could produce for the market with proper financial and technical aid.

Pittsburgh Plate Glass Co. has become the sole owner of the Southern Alkali Co. through the purchase of 49% interest in that company held by the American Cyanamid Co. Pittsburgh Plate previously owned 51%. The purchase price was announced as approximately $19,000,000.

## WEST GERMAN RUBBER INDUSTRY SHOWS GAIN DURING PAST YEAR

Berlin, Hanover and Hamburg-Harburg are traditionally the rubber centers of Germany. The varied output of West Berlin and the unusual competence of its rubber and asbestos workers have brought a growth in the past year, industry spokesmen say, that bodes extremely well for the share of rubber in the new Berlin development plan.

Chief products include technical goods, bicycle tires and tubes, machine tubes, floor covering and embossed mats, surgical soft rubber items, sponge rubber goods, soles and heels, sporting goods and rubberized fabrics. The industry, at present, uses about 70 tons of rubber a month. The total necessary import bill is about DM550,000. Rubber industry members are most anxious for the revival of buna production in Western Germany, which would save them considerable foreign exchange. The distribution of sales in the past two years has been as follows:

| | Average in % of total | |
|---|---|---|
| Shipped to | 1949 | 1950 |
| West Berlin | 47 | 34 |
| Western Germany | 46 | 60 |
| East | 6 | 3 |
| Abroad | 1 | 3 |

Hopes have been expressed that in connection with the Berlin development plan the rubber industry will be able to raise its employment role to 2,000. The industry would also like to increase its investment of DM3,500,000 to DM4,500,000. This would require an addition to the DM1,000,000 already obtained from ERP funds. The industry as a whole has been working at about 50% of capacity, but some plants are working extra shifts, and an average of 65% is hoped for this spring.

### Emery 955 Dimer Acid

Emery Industries, Inc., Cincinnati, Ohio, has established Emery 955 Dimer Acid as a standard sales product after two years of testing and standardization as a development product. Emery 955 Dimer Acid (dilinoleic acid) is a liquid, dibasic acid, viscous in nature, with an apparent molecular weight of approximately 600. It has excellent heat stability and low volatility. It undergoes the carboxyl group reactions typical of a monomeric acid. The company states that its polyfunctional nature allows polymerization, resinification, or similar type reactions with polyalcohols, polyamines, polyvalent metals, etc. Emery 955 Dimer Acid forms both soluble and insoluble soaps. Its long-chain polyesters have rubberlike properties. Polyamide resins of dimer acid exhibit a low melting point and are water-resistant. It also acts as a bodying agent in surface coatings and is a superior, partial replacement for hard-to-get drying oils, the company states.

Hobbs Manufacturing Co., Worcester, Mass., has prepared a list of simplified rules covering recommended procedure under defense order priority ratings. Copies are available from the company.

### Personnel Changes At Firestone

A. D. Miller, general manager of the Synthetic Rubber Division of the Firestone Tire & Rubber Co. since 1947, has been named to the staff of Dr. J. N. Street, director of chemical laboratories. In his new assignment, Mr. Miller will carry on special development work. Succeeding him as general manager of the Synthetic Rubber Division is C. A. Hill, formerly manager of the Firestone-operated government synthetic rubber plant at Lake Charles, La. Mr. Miller joined the company as a chemist in the General Laboratory 17 years ago while still attending college. He received a B.A. degree from Capital University in Columbus, Ohio, in 1935 and a degree in chemical engineering from Case Institute of Technology in 1940. In 1941 he was named head of the Technical Division of the Firestone-operated OKR plant in Akron. Two years later he became technical manager for all of the company-operated synthetic rubber plants, and in 1947 was named general manager of the Synthetic Rubber Division.

Before coming to Firestone in 1942, Mr. Hill was with the Sinclair Oil Co. His first assignment at Firestone was in connection with the construction of the synthetic rubber plant at Baton Rouge, La. Later, he joined the management staff at the Port Neches, Texas, synthetic rubber plant operated by Firestone. In 1945 he became manager of the synthetic plant operated by the company at Lake Charles, La. Mr. Hill was graduated from the University of Illinois in 1931.

In another appointment, William D. Gohr, formerly purchasing agent for the company, was named general manager of the company's Plant 3, which is manufacturing tank cannon, 75-mm. and 57-mm. recoilless rifles, Airpak jet engine containers and other defense products for the Government. Mr. Gohr joined the company in its first College Training Class in 1924. During World War II, he was general manager of the Bofors plant. He is a graduate of the Wharton School of Finance of the University of Pennsylvania.

### Packers Using Cryovac Process

A method, based on the Cryovac process, of centrally prepackaging fresh, cut-up chickens in trays for retail sale has been developed and is now being used by a number of large packers, Dewey & Almy Chemical Co. of Cambridge, Mass., announced recently. The method utilizes Cry-O-Rap film, now widely used for packaging smoked, cured and processed meats and frozen poultry. In the first phase of the central pre-packaging operations, the fryers are cleaned, dressed, cut-up and packaged according to weight in sanitary waxed cardboard trays. The filled trays are placed in moisture-proof Cry-O-Rap plastic bags from which the air is then exhausted. The bags are then vacuum sealed. In the last step, the filled bags are instantaneously immersed in hot water which shrinks the bag tightly around the tray, giving a smooth wrap with high product visibility. The completed packages are packed in shaved ice for delivery to retailers.

## WASHINGTON APPOINTMENTS

Thomas S. Nichols, president and board chairman of the Mathieson Chemical Corp., Baltimore, Md., has been named Deputy Administrator of the National Production Authority succeeding Glen Ireland who returned to his post with the Pacific Telephone & Telegraph Co.

Clark W. Davis, assistant general manager of the Grasselli Chemicals Department of E. I. du Pont de Nemours & Co., Inc., will be unable to fulfill his recent appointment as chief of the Rubber, Chemicals and Drug Division of the Office of Price Stabilization because of ill health. Mr. Davis was to have assumed his new duties on April 2.

Dr. Emanuel R. Piore has been appointed deputy chief of research and chief scientist of the Office of Naval Research.

Frank J. Haley, New York attorney and transportation specialist, has been named U. S. Navy representative on the recently established Committee on Transportation and Storage in the Office of Defense Mobilization.

Bonnell W. Clark, who retired as vice-president in charge of sales for the Westinghouse Electric Corp. in January, 1950, after 25 years' of service, has been named director of the Electrical Equipment Division of the National Production Authority.

Paul M. Bigley, assistant general sales manager of the Michigan Alkali Division of the Wyandotte Chemicals Corp., has been appointed to serve with the Economic Stabilization Agency. His duties have not as yet been detailed.

Ralph F. Wolf, manager of compounding research at the Barberton, Ohio, laboratories of the Columbia Chemical Division, Pittsburgh Plate Glass Co., has been loaned to the government as consultant to the Rubber Division of the Defense Production Administration.

Robert A. Lees, manager of the Akron, Ohio, laboratories of American Anode, Inc., has been loaned to the National Production Authority as an advisor on the allocation of liquid latex.

### Akron Firms Battle Tax Claims

L. E. Shunk Latex Products, Inc., and the Killian Manufacturing Co., both manufacturers of rubber prophylactics in Akron, Ohio, have gone to court to fight a Federal tax claim of $2,541,264. The case is being heard in the U. S. Tax Court in Cleveland, Ohio. The government contends that the owners of the two companies set up a sales organization and channeled a multi-million dollar business through it during the war years of 1942, 1943 and 1945. During this period, they paid taxes on their earnings as a partnership. Now the government seeks to tax the companies at higher corporate rates leading to the $2,541,264 claim. Both companies were sold to new owners a few years ago.

### Harwick Standard Suffers Fire

In one of the toughest fires to fight in the history of Akron, ten companies of the Akron Fire Department battled the blaze that almost completely destroyed warehouse and chemical stocks of the Harwick Standard Chemical Company on the night of May 2. The general office section of the plant was saved from collapse and much of the equipment and files were removed to safety by heroic efforts of both firemen and members of the Harwick organization.

While fire was still raging in the steel and concrete building, temporary offices were set up in a vacant store room a half block away and "business as usual" messages were flashed out to the trade by ten o'clock. Harwick officials said their inventory of chemicals in the plant at the time of the fire approximated $100,000 while estimated damage to building and equipment might run as high as $350,000. Most of the loss was covered by insurance and plans were made immediately to rebuild as soon as the debris could be cleared away. Cause of the fire is unknown.

Jack R. Moore, president of the Harwick company, announced that customers' requirements would be taken care of by direct shipment of materials from other warehouses and from manufacturing plants without interruption or delay in their schedules. New stocks of compounding materials will be on hand again at an Akron depot as quickly as temporary storage facilities can be organized and stocked. Only two years ago this new plant of the Harwick Standard Chemical Company was finished and occupied. The general offices were modernistically decorated and considered to be the most beautiful business offices in any plant of its size in Ohio. These offices, say officials, will soon be restored to their former appearance while the work of rebuilding the warehouse section gets under way.

### Gammeter Birthday Celebrated

Friends and business associates of John Rudolph Gammeter honored his 75th birthday at a special dinner held on April 6 at the Portage Country Club in Akron, Ohio. Charles F. Safreed, president of the McNeil Machine & Manufacturing Co., and Paul A. Frank, president of the National Rubber Machinery Co., acted as co-hosts for the affair. Many of the industry's most distinguished members were present and paid tribute to the guest of honor as one of America's foremost inventors. As a special remembrance of the occasion, Mr. Gammeter was presented with three bound volumes listing in detail the 266 patents issued to him by the U. S. Patent Office during his career.

### Mansfield Tire Debentures

Mansfield Tire & Rubber Co., Mansfield, Ohio, has privately placed with institutional investors $3,500,000 of 3¼% sinking fund debentures, due February 1, 1966. Proceeds from the sale will be used to increase the company's working capital. A. G. Becker & Co., Inc., acted as agent in the financing.

### Richardson Named Vice-President

William S. Richardson

William S. Richardson, president of the B. F. Goodrich Chemical Co., Cleveland, Ohio, has been elected a vice-president of the parent firm, the B. F. Goodrich Co. Mr. Richardson has been associated with the rubber industry since 1914. He joined B. F. Goodrich in 1926 as manager of the Planning Department in Akron. Two years later he became staff superintendent of the company's Industrial Products Division. Mr. Richardson served as general manager of the Industrial Products and Sundries Sales Division from 1941 to 1945. During World War II, he also served as chairman of the OPA Mechanical Rubber Goods Industry Advisory Committee. He was elected president of the B. F. Goodrich Chemical Co. when it was organized in April, 1945.

### Tubeless Tire Availability

National distribution of its tubeless tire has been achieved by the B. F. Goodrich Co., according to a recent announcement. Company officials explained that it was the original intention of the company to make the tubeless tire available in all of its 30 sales districts within a few months after the initial production more than three years ago. Instead, sales have greatly exceeded all expectations and production at Goodrich plants has not been able to keep up with demand.

### Lee Suffers Disastrous Fire

A disastrous fire resulting in damages estimated at approximately $500,000 and destroying some 5,000 pounds of natural rubber swept the plasticator building of the Lee Rubber & Tire Corp. at Conshohocken, Penna., on May 5. According to reports, fire broke out in the motor of the plasticator and swiftly covered the entire unit, subsequently engulfing the entire building. Some 100 volunteer firemen fought the blaze and brought it under control. Fortunately, no one was injured.

### Celanese Shifts Chemical Staff

Numerous shifts in personnel of the Chemical Division of the Celanese Corp. of America, as a result of expanding activities, were recently announced. Richard W. KixMiller has been named assistant general manager of the division. Kenneth D. Bowen, plant manager at Bishop, Texas, will continue in that post and will assume the additional responsibility of manager of plant operations of the division. John H. Frick has been named plant manager of the new chemical plant to be built at Pampa, Texas, details of which appear elsewhere in this issue. J. B. Phelps and Robert Clark are also moving to the new plant as production superintendent and resident engineer, respectively. William Orr has been named production superintendent at Bishop, succeeding Vincent Apwyll, who has been named manager of the Edmonton, Alberta, Canada, plant to be constructed by Canadian Chemical Co., Ltd., a Celanese affiliate. David Keck, formerly of the Bishop staff, has been named assistant plant engineer at Edmonton. H. K. Busch has been promoted to assistant production superintendent at Bishop, while C. Martin has been named to succeed Mr. Orr as superintendent of the formaldehyde unit. S. T. Ross has replaced Mr. Busch as superintendent of the products purification unit and Joseph Neely succeeds Mr. Phelps as superintendent of the acetic acid unit.

### Standards for Foam Mattresses

A "Recommended Commercial Standard for Latex Foam Mattresses for Hospitals" has just been circulated by the Commodity Standards Division of the U. S. Department of Commerce to producers, distributors, and users for acceptance. The purpose of this commercial standard is to provide a nationally-recognized specification for the guidance of producers, distributors, and users of latex foam mattresses; to promote fair competition and consumer confidence in products conforming to this standard, and to provide a basis for labelling and guaranteeing the quality of the product. It covers minimum requirements and methods of testing for one grade of latex foam mattresses made of either natural or synthetic type of rubber latex. Mimeographed copies, TS-5066, of this Recommended Commercial Standard may be obtained from the Commodity Standards Division, Office of Industry and Commerce, U. S. Department of Commerce, Washington 25, D. C.

### Claremont Pigment Names Agents

Claremont Pigment Dispersion Corp., Brooklyn, New York, has announced the appointment of the Palmer Supplies Co., with offices in Cleveland and Cincinnati, Ohio, as sole sales agent for the company in the state of Ohio. Effective April 1, the Joseph Zak Co., of Chicago, Ill., began activities as sales representative for the company in the metropolitan Chicago area. Also as of April 1, the Southern States Chemical Co., Atlanta, Ga., undertook sales representation of the company in the states of North and South Carolina, Georgia, Florida and parts of Alabama and Tennessee.

### To Direct Chemical Development

Warren A. Beman

Warren A. Beman, formerly a staff member in charge of textile work for the chemical products division of the Socony-Vacuum Oil Company, Inc., has been appointed to direct chemical products development for the company. A primary function of Socony-Vacuum's new activity will be to coordinate the company's development program on all chemical products by working closely with the research and development heads of other leading companies in the paper, textile, plastic, rubber and chemical fields. This is expected to make available to industry perfected complementary processing materials at the same time new products in these fields are released. A chemical engineering graduate of Purdue University in 1940, Mr. Beman also attended the graduate school of the Polytechnic Institute of Brooklyn. Previous to being transferred to the company's executive offices at 26 Broadway, New York, he worked in refinery engineering, the development section of Socony-Vacuum Laboratories and in field technical sales and service.

### Reports on Experimental Polymers

A report prepared by the Air Materiel Command of the U. S. Air Force in 1949 evaluating experimental polymers for aircraft rubber components is now available, the Office of Technical Services of the U. S. Department of Commerce announced recently. The report describes test procedures and the effect of varying polymerization conditions on the properties of experimental synthetic rubber polymers produced by the Office of Rubber Reserve. Emphasis was placed on the determination of the fuel resistance and low temperature properties of the experimental polymers. PB 102184, *Evaluation of Experimental Polymers Produced by the Office of Rubber Reserve*, 17 pages including tables, sells for $2.00 in microfilm, $3.75 in photostat. Orders should be addressed to the Library of Congress, Photoduplication Service, Publication Board Project, Washington 25, D. C., accompanied by check or money order payable to the Librarian of Congress.

# LOS ANGELES NEWS

Approximately 190 members and guests of the Los Angeles Rubber Group attended the April 10th meeting held at the Mayfair Hotel in Los Angeles, Calif. The technical session of the meeting was devoted to a panel discussion on "Rubber to Metal Bonding." Panel members included: Franklin J. French (Kirkhill Rubber), T. A. Reynolds (Stoner Rubber), Fred T. Schor (MacClatchie Mfg.), and Howard E. Wiley (Rubbercraft Corp. of Calif.). A full report on the panel discussion will appear in the June issue of RUBBER AGE.

Dr. Theodore Hsi-En, professor of international relations and head of the Department of Asiatic Studies at the University of Southern California, also addressed the meeting on "China and the Far East." The talk was well received by the group.

The May 1st meeting of the Los Angeles Group was to have been sponsored by the Plastic and Rubber Products Co. Arnold R. Davis, head of the Rubber Chemicals Laboratory of the Technical Service and Development Division, American Cyanamid Co., was to have addressed the technical session on "Antioxidants for Natural and Synthetic Rubbers." The regular meeting was to have been addressed by Chief William H. Parker of the Los Angeles Police Department. A full report on this meeting will be found in our next issue.

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The TLARGI Summer Outing has been scheduled for June 16 and 17 at Del Mar, Calif. The following members have been named to serve on the General Outing Committee: R. L. Short, Chairman; Carl Hoglund, Assistant Chairman, and Dan Budnick, Dick Behrman, Al Pickard, Deke Maddy, George Steinbach, Larry Snow, Tommy Hoyle, Dick White, Bob Bowen, and Elliott McLaughlin.

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On April 13, approximately 40 members of TLARGI participated in a golf tournament at the San Fernando Valley Country Club. Winners of the different events included the following: *Blind Bogey*, Stan Freeman (Witco); *Low Net*, Joe Hoefle (Plastic & Rubber Products); *Low Gross*, Wade Wiley (Goodyear); *Closest Tee Shot at the 15th Hole*, Harry Baker (Dill Mfg.); *Longest Drive from 1st Tee*, Bob Johnson (Rubber Products); *Longest Putt on Last Green*, Harry Franklin (Stillman Rubber); *Consolation Prize for the Most Trap Shots*, John Tyner (Dow Corning).

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W. J. Voit Rubber Corp. has announced plans for the formulation of a trophy to be presented annually to the most valuable Pacific Coast Conference football player. The award will be made through a vote of the Conference coaches, beginning with the 1951 season. The selected player will receive a smaller replica of the trophy while his name will be inscribed on the large perpetual award.

Frank Brennan, Los Angeles branch manager of the United States Testing Co., has announced the removal of that branch to a new location at 1723 South Maple Avenue. The newly-constructed building gives the laboratories several thousand feet of adaptable space where new equipment will be installed. Many of the company's services formerly referred to company headquarters in Hoboken, N. J., will now be conducted in Los Angeles. At present the Los Angeles branch is equipped to handle chemical, paint, engineering and engineering-inspection tests.

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American Cyanamid Co. has announced that construction will soon be started on a 64,000 square foot building in the Central Manufacturing District. The building will be leased to the company by the builders for a long term of years for a rental approximating $1,000,000. Designed to suit the company's requirements, the one-story building will contain 44,000 square feet of warehouse space and 20,000 square feet of air-conditioned offices. Additional land at the site affords an expansion potential should it be required at a later date. At present, American Cyanamid occupies office and warehouse space at a number of locations in the city of Los Angeles and at Azusa, Calif. The new building will serve to consolidate all these facilities to better serve the company's customers.

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Bill Rudko, formerly associated with the Thermoid Western Co. of Nephi, Utah, has joined the staff of the F. H. Maloney Co., Houston, Texas.

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California Rubber Products, Inc., Hawthorne, Calif., has begun construction of a 10,000 square foot addition to its Duct Department.

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Ben Trower, associated with the Bettis Rubber Co. for some time, has been named purchasing agent and office manager of the company.

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### Dayton Rubber Borrows $1,500,000

Dayton Rubber Co., Dayton, Ohio, has borrowed $1,500,000 from the Equitable Life Assurance Society on a 3½% note, maturing December 1, 1965. Lehman Brothers, New York, N. Y., acted as agent in the transaction. The borrowing raised to $5,500,000 the amount of notes that Dayton has outstanding with Equitable. The company has also made application with the New York Stock Exchange for the listing of 25,000 additional shares of common stock. The new shares will permit the company to put into effect the stock option plan for officers and key employees approved at the annual meeting in February. The additional stock will bring issued and outstanding shares to 378,341.

### Morris Anniversary Celebrated

Wm. Griffin Morris

A special presentation marking the completion of fifty years of service was made to William Griffin Morris, deputy chairman of the Greengate & Irwell Rubber Co., Ltd., at the firm's general annual meeting on April 11 in Manchester, England. On behalf of the directors, staff and employees, Merton E. Frankenburg, chairman of the company, presented Mr. Morris with his portrait in oils together with an illuminated volume containing expressions of affection and esteem from his friends and business associates. In an address, Mr. Frankenburg stressed the important part Mr. Morris had played in the development of the company over half a century. His hard work and devotion to duty, he said, would always serve as an example to those responsible for the conduct of industrial enterprise.

### Continental Carbon Expands Staff

Continental Carbon Co. recently announced a number of new appointments to its staff at company headquarters in Amarillo, Texas. Milton F. Shaffer, formerly chief production engineer of the Shamrock Oil and Gas Corp., has been named manager of the Gas Division; Gerald P. Wilson, since 1946 associated with the electrical engineering department of the Southwestern Public Service Co., has been appointed head of the Electrical Engineering Department, and James C. Phillips, previously manager of the B. B. Short Distributing Co., is assistant to the director of industrial relations.

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### Three Dead in Domestic Triangle

A domestic triangle ended in tragedy in Grand Rapids, Mich., on April 15, when Robert Le Roy, president of the Gillette Tire Sales Co. of Grand Rapids, shot and killed his wife and Arthur Westlund, sales manager of the Fisk-Gillette Tire Division of the U. S. Rubber Co., and then shot himself to death. Authorities said that Mr. Le Roy had left a note alleging that his wife had admitted infidelity. He leaves three children. Mr. Westlund, 50, leaves his wife and daughter.

### Named Schulman Plastics Manager

Frederick W. Dover

A. Schulman, Inc., Akron, Ohio, has appointed Frederick W. Dover as manager of the company's plastics operations. Mr. Dover, with 12 years experience in the plastics industry, will be in charge of buying, selling and processing of virgin plastics and reground molding compounds for the company. He holds an engineering degree from the University of Alabama, and was graduated from the Plastics Industries Technical Institute in Pittsburgh, Penna. Before joining the Schulman organization, he was engaged in research, production and sales of plastics materials. For many years, Mr. Dover has been active in Boy Scout activities. He has served as committeeman, advisor and scoutmaster.

### Goodyear Opens Luxemburg Plant

Goodyear Tire & Rubber Co. formally opened its new tire plant in Luxemburg on April 24. Production at the plant, which actually turned out its first tire some months ago, continued during the ceremonies. The plant is located about 15 miles from Luxemburg City, on a 44-acre plot. It employs about 350 workers, and was planned to supply the so-called Benelux market of Belgium, Holland and Luxemburg. Paul W. Litchfield, chairman of the board, and G. K. Henshaw, Goodyear vice-president in charge of foreign production, were present at the ceremonies, as was Mrs. Perle Mesta, U. S. Minister to Luxemburg. One month after production began the plant was turning out 150 tires daily, with no rejections.

### Revere Anniversary Celebrated

The plant of Plymouth Rubber Co., Inc., at Canton, Mass., was the scene of a recent ceremony marking the founding of the copper industry in America by Paul Revere 150 years ago. One of the buildings now occupied by Plymouth housed Revere's original copper rolling mill, the first in America. A bronze plaque honoring the founder has been placed on the wall of the building. Executives of Plymouth and of Revere Copper attended the dedicatory exercises.

### More Names in the News

M. H. Arveson, technical director of the Indoil Chemical Co., has been elected a director-at-large of the American Chemical Society to fill the unexpired term of Dr. Edward C. Britton of the Dow Chemical Co., who became an ex-officio member of the board of directors upon his recent election as president of the society for 1952.

R. Miles Booth, formerly assistant treasurer of the DeVilbiss Co., Toledo, Ohio, has been named treasurer of the company. C. Harold Samberg has been named assistant treasurer.

John A. Boll, associated with U. S. Rubber since 1930, has been named sales manager of the Fisk-Gillette Tires Division of the company succeeding the late A. G. Westlund. Lucian B. Lillie has been named assistant sales manager of the division, succeeding Mr. Boll.

Charles M. Muchnic, a director of the United Engineering & Foundry Co., and directly engaged in the company's foreign business, has been awarded the French Legion of Honor with the rank of Chevalier by the French Government as a token of gratitude for the eminent services he rendered to the economic reconstruction of France.

W. D. Croswhite, Sr., formerly production superintendent of the Painesville, Ohio, plant of the Industrial Rayon Corp., has been appointed manager of the company's Covington, Va., plant, succeeding I. T. Meyer, who has been transferred to the executive staff in Cleveland, Ohio.

Joseph H. Rowe, previously associated with the Materials Testing Laboratory of the Texas Highway Department, has joined the technical staff of the research laboratory of the Natural Rubber Bureau, Washington, D. C.

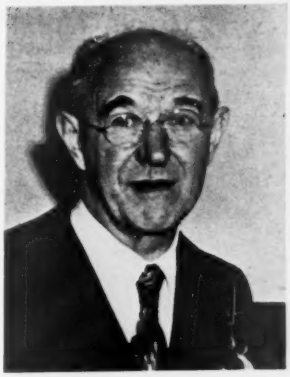
George C. Sheldon, previously sales manager of the General Latex & Chemical Corp., Cambridge, Mass., has been appointed sales manager of the American Resinous Chemicals Corp. of Peabody, Mass.

Edward F. Krieger, formerly factory manager, has been elected vice-president in charge of manufacturing for the Bolta Co., and Bolta Products, Inc., both of Lawrence, Mass.

David C. Hawk, formerly associated with the Belden Manufacturing Co. as a development engineer, has joined the B. F. Goodrich Chemical Co. at Avon Lake, Ohio, in a similar capacity.

William A. Blume, vice-president of the Thermoid Co. and a director and former vice-president of the Asbestos Manufacturing Co., a Thermoid subsidiary, has been elected president of Asbestos Manufacturing.

### Retires From Raybestos-Manhattan



Charles Kuhn

Charles Kuhn, oldest active employee of the Manhattan Rubber Division of Raybestos-Manhattan, Inc., Passaic, N. J., retired from active service on April 30. Mr. Kuhn, who started as an office boy in 1894, had 57 years' service as a sales executive with the company at the time of his retirement. In addition to his career in sales, Mr. Kuhn is nationally known for the rubber specialties he developed and for which he established markets.

### New Testing Services Available

South Florida Test Service, 4201 N.W. 7th Street, Miami 34, Fla., has announced that services and facilities are now available for parallel light transmission and haze determinations on plastic materials following exposure in Southern Florida. These services are in accordance with Federal Specifications LP-406a Method 3021 and Specification MIL-P-6887, and in conformance with A.S.T.M. D1003-49T and other specifications. The company states that installation of a Hunter-Pivotable-Sphere Hazemeter and Photometric unit has been completed, as well as additional instrumentation for the testing of plastics, rubber, textiles, paints, etc., to sunlight (direct, under glass and filters) and weathering, to inland or salt atmospheric conditions, tidewater, total immersion as well as special tests.

### Liquidating Rubber Factories

Eagle Industries, Inc., 110 Washington St., New York 6, N.Y., has announced that it has begun the liquidation of two rubber units, one a large molded goods plant in Brooklyn, N. Y., and the other a rubber tile plant in Detroit, Mich. The Brooklyn unit, part of the plant occupied by the Ideal Rubber Products Co., includes hydraulic presses, pumps, accumulators, vulcanizers, two Royle extruders, air compressors, etc. The Detroit unit contains a National extruder, rubber mills of various sizes, a Banbury-type mixer, comprehensive laboratory equipment, hydraulic presses, etc. Further information regarding the plants in question can be secured direct from Eagle Industries, Inc.

# CANADIAN NEWS

For the three days of June 18, 19, and 20, Winnipeg will be the mecca for Canadian chemists and chemical engineers attending the 34th Annual Conference of the Chemical Institute of Canada. In addition to the 76 technical papers, other attractions at this conference will include the presentation of the Chemical Institute of Canada Medal for meritorious service to the profession, the delivery of the Leroy Egerton Westman Memorial Lecture, and plant visits.

*Chemical Engineering:* A paper of particular interest to petroleum engineers and chemists will be presented at this Division's sessions. This paper is entitled "Development of the Alberta Bituminous Sands" and will be presented by Consulting Engineer S. M. Blair who has recently completed a comprehensive study on this subject for the Government of the Province of Alberta. Technologists from industrial and government organizations who were associated with Mr. Blair in various special fields of the study will take part in the discussion.

Other interesting papers to be presented to the chemical engineers include: Developments in Manitoba's mineral industry; Chemical plants for Alberta; Studies on Saskatchewan uranium ores; Commercial development of Dow butylene dehydrogenation catalyst; Production of high purity zinc at Flin Flon; Extraction of wax from Saskatchewan lignite; The new Winnipeg refinery of Imperial Oil Limited.

*Chemical Education:* Papers presented before this Division's sessions will include: The training of chemists for industry; Chemical logic; The 'why', 'what' and 'how' of an ideal chemist; and Chemical engineering education.

*Agricultural Chemistry, Biological Chemistry, and Organic Chemistry:* These Divisions of the Institute are jointly sponsoring a symposium during the conference at which three speakers will discuss the use of radioactive tracers in agricultural chemistry, microbiological processes in the industrial utilization of agricultural products, and the chemistry of insect repellency.

A joint technical session is also to be sponsored by the Agricultural Chemistry and Biological Chemistry Divisions. Topics at this joint session will include: Nutritional studies with white corn meal; The distribution of amino acids in the urines of normal males; and several papers on vitamins A, $B_6$, $B_{12}$.

Other papers of interest to agricultural chemists will include: The effect of soil zone on nutrients in vegetables; The metabolic product pattern of wood-rotting fungi; Grain grading problems; The measurement of radioactive phosphorus in plant materials; and The enzymatic hydrolysis of synthetic polypeptides and gluten.

Biological chemists will also have the opportunity of listening to papers on such topics as: The lipids of the nervous system; Conditions affecting the production of liver necrosis by dietary means; Separation of metabolic products of dicumarol from urine; and The sugar content of heparin.

*Protective Coatings:* Among the papers on this subject are: Determining fire-retardant values of surface coatings; The use of magnesium in underground pipeline protection; Wax-type protective coatings for industry; and Modern red lead paints.

*The Organic Chemistry and Physical Chemistry Divisions:* These divisions will be very active at this Conference as a total of 26 papers will be presented at their technical sessions. Included with these are papers on such topics as: Synthesis of syringaldehyde from vanillin; Coal flames; Oxidation of mercaptans by hydrogen peroxide; Production of radioactive sulfur in Canada; Conductances of strong solutions of strong electrolytes; The newer chemistry of acetylene; The system aluminum-indium-tin; the Corrosion of silver.

*Analytical Chemistry:* The two papers to be presented before this Division are: The chromatographic analysis of distilled products from the Alberta tar sands; and Photometric methods for determining small amounts of fluorine and phosphorus.

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Seiberling Rubber Co. of Canada, Ltd., Toronto, Ont., has reported a net profit of $274,672 in 1950, which is equal to $5.49 per share, compared with $22,149, or 44c a share, in 1949. Working capital as of December 31, 1950, totaled $1,500,016, against $1,369,368 at the end of the preceding year. M. L. Brown, president of the company, reported that the rubber industry in Canada operated at the highest rate in its history during 1950 and that the company maintained its relative position. Mr. Brown predicted a satisfactory volume of business in 1951. The report stated that a total of $336,514 was added to fixed assets during 1950.

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Canada Wire and Cable Co. has reported a net income of $1,932,108 (Canadian currency) in 1950, which is equal to $10.06 a class B common share, compared with $1,297,483, or $7.82 a class B share in 1949.

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### Donates Banbury to Purdue

Dr. Fernley H. Banbury, inventor of the internal mixer which bears his name, has presented a laboratory size Banbury Mixer of the latest design to Purdue University. Dr. Banbury was graduated from Purdue in 1906 and the University in 1948 conferred on him the honorary degree of Doctor of Engineering. Although retired since 1943, Dr. Banbury is still active as a consultant and continues to serve on the board of the Farrel-Birmingham Co. of Ansonia, Conn., sole manufacturers of the Banbury Mixer in this country.

### General Electric 81267 Primer

The Chemical Department of the General Electric Co. at Pittsfield, Mass., has announced the development of a new primer which makes possible a bond between silicone rubber and metals or ceramics which is said to be stronger than the rubber itself. Designated as G-E 81267 primer, this new development is a thin, light-colored liquid. To mold and bond silicone rubbers to a surface, it is necessary to first remove all grit and dirt from the surface. The new primer is then applied by dipping and draining, spray, or brushing. The film should then be allowed to air dry for 20 minutes. The primed surface can then be molded under pressure at 125° C. against freshened G-E Silicone Rubber compound from 10 to 20 minutes, or 20 to 25 minutes in 40 psi steam, and may usually be removed from the mold hot. The development of the primer is said to make possible a wide variety of silicone rubber-to-metal molded products which include shock and engine mounts that resist both high and low temperatures. Also, improved rubber-glass laminated structures are now possible and silicone rubber in conjunction with the primer can be used as an adhesive with unusual new properties, the company maintains.

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### Ensolite Expanded Plastic

U. S. Rubber Co. has developed a flexible expanded plastic which is being used as a vest and watertight face seal in quick-donning battle suits now being made by the company for the U. S. Navy. The plastic, extremely light in weight, can also be used for life vests. Known as "Ensolite," it is honeycombed with millions of tiny non-connecting air cells that give it great buoyancy. The material is soft in feel as well as light in weight. It can stay afloat for long periods because of its resistance to moisture absorption. Since it absorbs shock from impact blows, it can also be used in protective body pads for basketball, football, soccer and hockey players. It will not absorb perspiration and can be molded in any shape. Ensolite is available in a range of densities from 4 pounds to 15 pounds per cubic foot. It is made in flat sheets from 3/8 to 1 1/4 inches thick and can also be molded in contoured shapes.

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### Naunton Retires from I.C.I.

Dr. W. J. S. Naunton has officially retired as director of the Rubber Service Laboratories of Imperial Chemical Industries, Ltd. Dr. Naunton started the first rubber laboratory for the company, located in Manchester, England, before the end of World War I and was responsible for the initial production of the company's extensive line of accelerators and antioxidants. Over 100 patents have been issued to him and he was in constant demand as a speaker at rubber technical conferences throughout the world. Dr. Naunton's most recent visit to this country occurred last year on the occasion of the International Rubber Meeting held in Cleveland by the Division of Rubber Chemistry, A.C.S.

### McNeer Named Sales Manager

Clinton O. McNeer

Clinton O. McNeer, formerly Chicago district sales manager for the Chemical Division of the Goodyear Tire & Rubber Co., has been named sales manager of the division with headquarters in Akron. Company officials stated that the creation of the sales manager post was prompted by the rapid expansion of sales activities by the Chemical Division. Mr. McNeer will take over the direction and coordination of all sales activities with representatives about the country. A native of Hinton, W. Va., Mr. McNeer is a graduate of the University of West Virginia, and has been affiliated with Goodyear for 17 years. Following about five years at the St. Marys, Ohio, plant on Pliofilm production, he became a technical advisor on plastic coatings, and was assigned to field work at Cincinnati, Ohio, in 1946, transferring to the Chicago district two years later. Mr. McNeer will be succeeded at Chicago by J. A. Weatherford, who, for some time, has served as a special representative for the Chemical Division in the Chicago territory. The division has also established a new district office in St. Louis, Mo., with Robert E. Workman as manager. Previously, Mr. Workman served accounts in the St. Louis area as a field representative.

### 3M Announces Expansion Program

Details of a $6,500,000 plant expansion program were recently announced by the Minnesota Mining & Manufacturing Co. of St. Paul, Minn. Most of the projects, located in 10 cities and 8 states, are already under way. Work on the others is due to begin shortly. The firm is expanding facilities at Atlanta, Ga.; Bristol, Penna.; Buffalo, N. Y.; Cleveland, Ohio; Lamont, Ill.; Wayne, Mich.; Boston, Mass.; and Hastings, Hutchinson and St. Paul, Minn. Company officials stated that the expansion program would provide additional manufacturing and storage facilities for all of the company's major production divisions. The projects mark the latest step in a long-range building program. The company spent $47,000,000 for expansion purposes in the five-year period ending in 1950.

### Goodyear Anti-Icing Equipment

Installation of electrically-heated anti-icing equipment on the first jet-powered commercial plane in North America, the Canadian Avro Jetliner, has been announced by the Goodyear Tire & Rubber Co. The anti-icing equipment consists of resistance wire elements molded into an erosion-resistant synthetic rubber compound. On the Avro Jetliner, it has been installed on leading edges of wings, cabin air intakes and horizontal and vertical stabilizers. Known as the Goodyear "Iceguard," it is about 1/10 of an inch in thickness and extends about 30 inches around the leading edge of each surface. The center lines of each wing and tail leading edge are heated continuously to keep these particular areas free from ice at all times, while the adjacent areas are heated intermittently to break the ice loose after allowing it to form a slight build-up. The loosened ice is removed by aerodynamic forces. Company officials explained that this cycled heating serves also to prevent water runback and resultant ice formation aft of the protected surfaces as well as effecting considerable economy and power required.

### Borgeson Named Chief Engineer

James L. Entwistle Co. of Pawtucket, R. I., builders of machinery for the wire and cable industry, have announced the appointment of Sidney E. Borgeson as chief engineer. Mr. Borgeson started as a development engineer for the Western Electric Co. Later, he was associated with the General Research Laboratories and the Central Engineering Department of the General Cable Corp. He has set up several plants and developed equipment for the production of various types of wire and cable. A graduate of the University of Minnesota, Mr. Borgeson is a member of A.S.M.E. and the New Jersey Society of Professional Engineers. He has written many papers on developments and new methods in the wire and cable field. The Entwistle company is planning a development program centered around Mr. Borgeson which will result in major advances in the equipment available for the wire and cable industry.

### Vansul Pigments for Vinyls

Vansul & Co., Englewood, N. J., has developed a series of tested dispersed organic pigments for use in coloring vinyl film and sheeting. In powder form, free-flowing and non-dusting, these dispersions are designed for use in the pre-blending or dry blending techniques. A ready-mix with dry vinyl resin may be made prior to fluxing, with a resultant rapid and complete dispersion after fluxing, the company states. An exclusive colloidal process is said to give not only a uniform particle size but develops a maximum of color strength often 25% over and above the actual color content. With a high color concentration of 50%, the balance vinyl resin and dioctyl phthalate, production runs have shown this material to be far superior to regular dry color in efficiency and end use quality, the company claims.

### Roemer Joins Acushnet Process

William J. Roemer

William J. Roemer, formerly associated with the Bristol Manufacturing Co., of Waterbury, Conn., has joined the Acushnet Process Co., New Bedford, Mass., as purchasing agent. Mr. Roemer had been associated with Bristol Manufacturing for 28 years. He has been an active member of the Connecticut Purchasing Agents' Association, of which he is a past-president, and is also a member of the National Association of Purchase Agents. Mr. Roemer is the author of several articles on purchasing, including "How Can P. A. Help the Salesman," "Purchasing for Profit," and "Buying the Right Quantity."

### Oberfell Awarded Special Honor

A "certificate of appreciation" was awarded to G. G. Oberfell by the Division of Refining of the American Petroleum Institute at a dinner held at the Mayo Hotel in Tulsa, Okla., on May 2. Dr. Oberfell, who retired last July as vice-president in charge of research and development of the Phillips Chemical Co., is currently a special consultant to the Office of Rubber Reserve on the synthetic rubber program. A nationally recognized authority on petroleum research, Dr. Oberfell established the research and development department for Phillips when he joined the company in 1925. The certificate was presented for outstanding services to the API in the fields of automotive research and conservation of natural resources.

### Clarke Named Plant Manager

W. R. Clarke, formerly production manager of Plant 2 of the Firestone Tire & Rubber Co. at Akron, Ohio, has been named acting manager of the plant succeeding A. L. Weyend who retired as plant manager after 40 years' service with the company. A native of Orlando, Fla., Mr. Clarke was graduated from the University of Florida in 1930 with a B. S. degree in chemical engineering. He joined Firestone in 1930. During his years with the company, Mr. Clarke has served in England and in Brazil in production capacities for the company.

# OBITUARIES

### D. R. Burr

D. R. Burr, retired former consulting manager of the Mechanical Goods Sales Department of the Goodyear Tire & Rubber Co., died at Ft. Lauderdale, Fla., on April 20. He was 77 years old. Long known as the dean of the company's Mechanical Goods Sales Department, Mr. Burr joined Goodyear from the Diamond Rubber Co. in 1913 as division manager in mechanical goods sales. He was appointed assistant manager of the division in 1916, spending two years with the Export Division to establish a Mechanical Goods Sales Department in Australia and New Zealand. He returned to Akron in 1919 and in 1920 was appointed manager of the department. Mr. Burr handled that position until 1933 when he was named consulting manager. He retired in 1938. A native of Columbus, Ohio, Mr. Burr attended Ohio State University before joining Goodyear. Funeral services were held in Ft. Lauderdale on April 22.

### Alexander Smith

Alexander Smith, assistant chief engineer of the Farrel-Birmingham Co., Ansonia, Conn., died on April 27 at his home in Ansonia, Conn. Mr. Smith was born in 1895 in Aberdeenshire, Scotland. Completion of his engineering apprenticeship there was followed directly by service in the British Navy from 1914 to 1919. In the succeeding years he came to Ansonia, where he worked as draftsman and engineer for leading engineering firms. For the past 25 years he had been employed by the Farrel-Birmingham Co. Mr. Smith was appointed assistant chief engineer in 1947. Known especially for his skill and experience in sugar mill design, he contributed in great measure to virtually all the units produced by the company. During his service with Farrel-Birmingham, Mr. Smith served on the company's Operating and Patent Committees.

### Harold E. Langdon

Harold E. Langdon, formerly manager of mechanical goods sales, Central Division, Goodyear Tire & Rubber Co., and who for the past year has been handling special accounts, died on April 29 at his home in Akron, Ohio. A native of Akron, Mr. Langdon was graduated from Kenyon College. He joined Goodyear in 1916 as a member of the Mechanical Goods Department in Pittsburgh, Penna. Later, he was transferred to Australia and then to Boston, Mass. He headed mechanical goods sales for the Western Division for 18 years, and in 1949 was named manager of the Central Division. Private funeral services were held at the Billow Funeral Home in Akron. He leaves his wife, a son, and a brother, C. R. Langdon, manager of Goodyear's sales and office personnel.

### William T. Hunter

William T. Hunter, a director and former vice-president of the Scovill Manufacturing Co., Waterbury, Conn., died on April 19 in White Plains, N. Y. He was 70 years old. A native of Portland, Conn., Mr. Hunter went to work for A. Schrader's Son, Inc., of Brooklyn, N. Y., more than a half-century ago. He rose to general manager and then president of the firm until 1930 when the company was absorbed by Scovill. In 1935, Mr. Hunter was elected vice-president of Scovill in charge of the Schrader Division. In 1949 he retired as an officer of the company, but remained a director. He was also a director of the Merchants Refrigerating Co., the Home Life Insurance Co., and the Home Title Guarantee Co., all of New York. He was also a director of the Stamford Trust Co., and a trustee of the East Brooklyn Savings Bank, Brooklyn Hospital, and the Brooklyn Institute of Arts and Sciences. His wife, three daughters and two sons survive.

### Edgar E. Morris

Edgar E. Morris, works manager of the Brown Co., Berlin, New Hampshire, died suddenly on March 27 at the Maine General Hospital in Portland, Maine. Born in Gorham, New Hampshire, in 1895, Mr. Morris went to work for the old Berlin Mills Co. in 1912. Five years later he was transferred to the Accounting Department where he was eventually promoted to chief accountant. In 1928, Mr. Morris was licensed as a certified public accountant. In 1932, he was named superintendent of the Paper Division of the Brown Co. Mr. Morris continued as superintendent until November, 1944, when he was promoted to works manager. In this capacity, he was responsible for all manufacturing operations of the company.

### Walter B. Freeman

Walter B. Freeman, retired experimental engineer for the B. F. Goodrich Co., died on April 4 at his home in Cuyahoga Falls, Ohio, after a short illness. He was 71 years old. Mr. Freeman retired in 1947 after 33 years with Goodrich. He was a member of the Goodrich 20-Year Club. Services were held on April 7 in the McGowan-Reid Funeral Home in Cuyahoga Falls with interment in Oakwood Cemetery. His wife and daughter survive.

### Harvey Fox

Harvey Fox, Chicago manager of the American White Cross Laboratories, Inc., of New Rochelle, N. Y., died at his home in Chicago on March 23. Mr. Fox, a Chicago resident since 1880, was past-chairman of the round table of the Chicago Rotary Club and a member of the Chicago Drug and Chemical Club.

### William T. Bell

William T. Bell, manager of distributor sales for the Mechanical Goods Department of the Goodyear Tire & Rubber Co. since 1941, died suddenly of a heart attack on April 24 at Houston, Texas. He was 61 years old. With the company for more than 38 years, Mr. Bell had handled positions as Chicago district mechanical goods office manager and sales engineer during his career. He had been appointed manager of hose sales and railroad sales with headquarters in Akron in 1919, positions he held until his appointment as manager of distributor sales. Before joining Goodyear, Mr. Bell had been associated with the Diamond Rubber Co. and the B. F. Goodrich Co. A graduate of Northwestern University, he was a Scottish Rite 32nd degree Mason and a member of the Independent Order of Odd Fellows. His wife and daughter survive.

### William H. Yule

William Head Yule, former general manager of industrial products sales for the B. F. Goodrich Co., died on April 14 in Rio de Janeiro, Brazil. Mr. Yule, who was 67 years old, had been on a tour through South America. Born in Kenosha, Wisc., Mr. Yule was graduated from Harvard University with honors in 1906. He joined Goodrich in 1915, first in New York, and later in Akron in his managerial sales post. During World War I he had charge of the company's services to the U. S. Government. Mr. Yule leaves his wife and four sons.

### Richard H. Newell

Richard H. Newell, factory manager of the Wilsolite Corp., of Buffalo, N. Y., died on April 8 in that city. Mr. Newell began his business career with the Fisk Rubber Co., interrupting this connection to serve in World War I. Later, he was associated with Quaker Rubber, Gates Rubber and the Rubbercraft Corp. He was also associated with many related enterprises, not only in the East but on the West Coast. Mr. Newell was a member of the Masonic Lodge of Inglewood, Calif., and the Los Angeles Rubber Group. His wife and daughter survive.

### Edward K. Jobbins

Edward K. Jobbins, a vice-president of the W. C. Hardesty Co., New York, N. Y., died unexpectedly on April 21 in Washington, D. C. Mr. Jobbins had been serving temporarily with the Office of Price Stabilization. He was a member of Sigma Xi fraternity.

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Advantages of Neolac 600 enamel finish paint which utilizes a new resin, C-34, are described in a new bulletin released by the U. S. Stoneware Co., Akron 9, Ohio. Ask for Bulletin 239.

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Offices and laboratories of the Burrell Corp. have been moved to new quarters at 2223 Fifth Avenue, Pittsburgh, Penna.

### Additional Tax Writeoff Grants

Additional Certificates of Necessity to encourage construction of new or expanded facilities have been issued by the Defense Production Administration. The certificates authorize the holders to deduct from taxable income 40 to 100% of the cost of the facilities during the next five-year period. Among the grants issued recently were the following:

Dow Corning Corp., Midland, Mich., $1,460,000 for the production of silicone rubber.

U. S. Rubber Co., Passaic, N. J., two grants; one for $86,472, covering the production of hose, and one for $13,693 for the production of dispense package side panels.

Okonite Co., Passaic, N. J. $10,000 for electrical shipboard cable.

Pacific Moulded Products Co., Los Angeles, Calif., $5,609 covering natural and synthetic rubber research.

General Cable Corp., Perth Amboy, N. J., $28,919 for flexible cables and field wire.

General Insulated Wire Works, Inc., Providence, R. I., $17,085 for Signal Corps wire.

Hatfield Wire & Cable Division of Continental Copper & Steel Industry, Inc., Hillside, N. J., $890,139 for field wire.

Okonite-Callender Cable Co., Inc., Paterson, N. J., $80,140, for Signal Corps wire.

### Taylor Marks 100th Birthday

The year 1951 marks the 100th birthday of the Taylor Instrument Companies of Rochester, N. Y. Starting as a tiny partnership for making household thermometers and barometers, the business of Kendall & Taylor showed an inventory in 1851 listing total assets at $919.00, of which, $600.00 was for "knowledge of the business." The company has since become a multi-million dollar corporation manufacturing some 8,000 variations of its basic products and distributing them all over the world. Branch offices cover the country, and the manufacturing facilities of subsidiaries in Canada and England serve other parts of the world. The tiny thermometer company of 1851 is now said to be the largest instrument company of its kind in the world, serving the home, the medical profession and industry with instruments to indicate, record or control temperature, pressure, flow, force, liquid level and humidity.

### Patent Granted New V-Belt

Charles W. Dean, 25 East Alameda Avenue, Denver 9, Colo., has been granted U. S. Patent No. 2,540,245, February 6, 1951, for a new V-belt which, it is claimed, consumes approximately one-eighth less rubber and out-performs any solid V-belt now in use. The outstanding feature of the new belt is a hollow center with an open slot leading to the outside. This provides ventilation for cooler running and release of inner pressure which, heretofore, have been the chief cause of breakdown and failure of V-belts in service.

### "E-Z Lift" Bowling Ball Grip

An effective bowling ball grip claimed to have advantages of easy and secure holding or gripping with greater delivery-control has been announced by the Manhattan Rubber Division of Raybestos-Manhattan, Inc., Passaic, N. J. The new feature, known as the "Manhattan E-Z Lift,"

consists of depressions machined by custom-fit in especially drilled finger holes in which the tips or first joints of the finger hook. This, according to the company, gives the bowler a more secure grip with less effort than is possible with regular drilling and does not interfere in any way with the release of the fingers when the ball is delivered. The "E-Z Lift" under the name "Hook Grip" has already won considerable favor in the East with many bowlers claiming improved scores and better all-around bowling performance.

## LABOR NOTES

Striking members of the URW at the U. S. Rubber Co. plant in Fort Wayne, Ind., returned to work on April 9. The plant had been shut down since April 4 over the dismissal of 18 women workers in the Fuel Cell Department. URW had called the strike unauthorized. The dismissal of the women will be handled under grievance procedure; however, U. S. Rubber announced it had filed a $325,000 damage suit against the union as a result of the walkout.

URW has announced union shop election victories in three New England plants of the U. S. Rubber Co. The plants include two in Naugatuck, Conn., and one in Woonsocket, R. I.

Whitley P. McCoy, prominent labor arbitrator and professor of law at the University of Alabama, has been retained as impartial umpire for the hearing of labor grievances by the Goodyear Tire & Rubber Co. and the URW.

Production at the Sun Rubber Co. at Barberton, Ohio, was resumed on April 23 as 60 pressroom employees returned to work. The pressroom employees walked off the job on April 18 in protest over piece work rates. As a result, some 1,000 workers were idled. Meetings have been scheduled between company and URW officials to discuss grievances.

### SPI Plans Annual Meeting

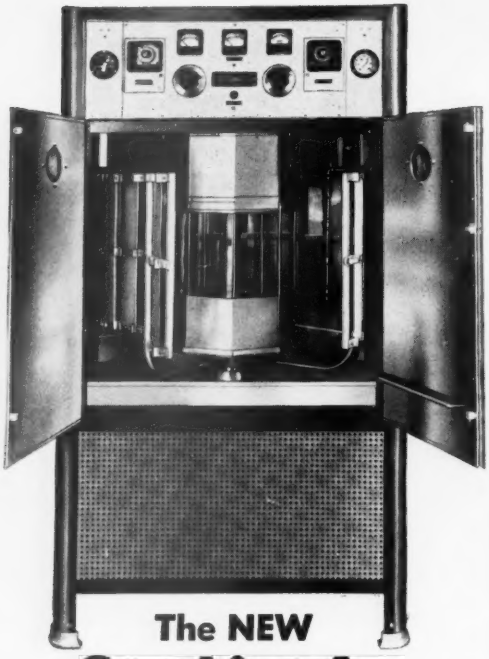
The annual meeting of The Society of the Plastics Industry, Inc., will be held this year at the Greenbrier Hotel in White Sulphur Springs, West Virginia, on May 24 and 25. The program will be built around the nation's defense efforts. Speakers from the Army and Navy will report on the latest uses of plastics in their fields. An up-to-the-minute interpretation of NPA regulations affecting plastics will be presented by a National Production Authority official. A specialist from the Office of Price Stabilization will discuss the OPS pricing regulations and operation under them. Competent authorities will analyze the plastics raw material situation with particular emphasis on supplies in the future. At the banquet Thursday evening, May 24, presentation of the Tenth Annual John Wesley Hyatt Award will be made by Gov. Okey L. Patteson of West Virginia; announcement of the new SPI officers and members of the Board of Directors will be made, and the speaker of the evening will be Arthur H. (Red) Motley, President of Parade Publications, Inc. In addition, meetings of several divisions of the plastics industry will take place during this two-day session, attendance at which is open only to members of the Society of the Plastics Industry, Inc., and employees of member companies.

### Named Raybestos Vice-Presidents

George W. Marshall, Jr. and Alvin F. Heinsohn have been elected vice-presidents of Raybestos-Manhattan, Inc. of Passaic, N. J. Mr. Marshall has been sales manager of the company's Asbestos Products Division since 1947. In his new capacity, he will continue to direct sales activities on asbestos brake linings, clutch facings, asbestos textiles, mechanical packings and powdered metal friction material. His headquarters will be at the firm's Manheim, Penna., plant. Mr. Heinsohn has been named vice-president in charge of the General Asbestos & Rubber Division at North Charleston, S. C. He had been manager of the North Charleston plant since 1944. Both Mr. Marshall and Mr. Heinsohn are directors of Raybestos-Manhattan. Other elections announced were W. Ward Kievit, as assistant treasurer; William H. White, assistant secretary, and Charles J. Geilfus, assistant secretary.

### Develops New Racing Car Tire

Firestone Tire & Rubber Co., Akron, Ohio, has developed a new racing car tire which has undergone extensive tests at the Indianapolis Speedway. Wilbur Shaw, three-time winner of the internationally famous Indianapolis 500 and now president of the Speedway, claims that the new tire will increase the speed of racing cars "up to four miles an hour." The new tire has an improved tread contour and a new tread compound. These improvements are said to provide greater tread life and easier car handling, especially in the turns. Test speeds averaged between 128 and 132 miles per hour, which enabled technicians to thoroughly check for heat generation, car handling and rate of tread wear.



The NEW
**Sunshine Arc Weather-Ometer**
**Type XW**

***A modernized and redesigned version of the open flame X-1 and X-1-A Weathering Units***

Many of the control features that have proven their dependability in the Atlas Twin Arc Weather-Ometer have been combined with some features of the original X-1-A weathering unit to make a new Weather-Ometer of advanced design.

In the Type XW a new means of maintaining constant temperature is provided. Far more accurate temperature control is now available.

Radiation is from a Sunshine Carbon Arc which is of the motor-driven, open-flame type. Natural sunlight or intensified ultra-violet radiation is available depending upon the type of carbons and filters used. The light source has been improved to provide 16 hours of continuous operation as well as a number of other added conveniences.

All instruments are located on a convenient control panel, including an arc voltage setting switch and meter, cycle control of light and water spray, 1 to 24 hour shut-down time switch, thermo-regulator and running time meter.

Type XW is fully automatic and may safely be left in unattended operation overnight. If deionized water is to be used, aluminum spray piping can be furnished. The capacity of the stainless steel lined testing chamber is 54 panels. The machine is sturdily constructed and is shipped assembled, ready for connection.

**ATLAS ELECTRIC DEVICES COMPANY**
361 West Superior St., Chicago 10, Ill.
***FADE-OMETERS • LAUNDER-OMETERS • WEATHER-OMETERS***

# NEW EQUIPMENT

## Joanna All-Steel Winding Core

Finding use in winding operations in the rubber, plastics and other fields, the Joanna Mill Roll and Winding Core manufactured by Production Metal Products Co., Inc., 1550 West Cortland St., Chicago 22, Ill., is made of 16-gauge steel tubing. It has double-thick spot welded reinforced steel ends with 1¼-inch or 1½-inch

square holes for easy locating and winding. The cores are furnished in 3⅛, 4 or 5-inch O. D., in any length. The firm is also producing the cores from 11-gauge steel and is offering aluminum cores in 6 or 8-inch O. D. Metal end paper shipping cores for rubber-coated cloth, plastic sheeting, etc., featuring the patented self-locating ends, are also being produced by the company. The tubing is of high kraft content with a crush resistance of 7,500 pounds, while the ends are of 16 or 20-gauge steel. These tubes are furnished in any length with an O. D. of 3½ inches and a ¼-inch wall.

## Bristol Strip-Chart Dynamasters

Designed for measurement of temperature, resistance, conductivity, strain, position, inductance, pressure or force, the Series 500 Strip-Chart Dynamaster Electronic Instruments developed by the Bristol Co., Waterbury, Conn., will handle any variable which can be measured in terms of impedance. In addition, the instrument can be used for electric power totalization and as the receiver for Bristol's system of telemetering. The measured variable is recorded on a chart 11¼ inches wide and indicated on a large scale. In addition to the single record model, instruments are available for as many as 16 different records on the same chart. Models are offered for full-scale pen travel in 7 seconds, 3 seconds, and ⅔ seconds, with a full range of standard chart speeds from 1 inch per hour to 120 inches per minute. All Dynamaster strip-chart instruments are housed in a moisture, fume and dust-proof case suitable for wall, flush-panel or front-of-panel mounting. The scale and recording mechanism are mounted on the front of a hinged aluminum alloy panel, which is easily swung out to gain access to the electric components or the control mechanism.

## THE STORY BEHIND THE WORD...

# CANARY

*Oddly enough the name of this pretty songbird came from the Latin word for dog. For the early Roman mariners who discovered the Canary Islands named them Canaria from their word "canes", because of the packs of dogs that infested the island. The birds that came from this place were named after the English version of the Island's name—Canary.*

A long record of strength, stability and progressive leadership has made the word Muehlstein—the First Name in Scrap Rubber and Scrap Plastic.

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# Men who Know PRODUCTION MACHINES Choose

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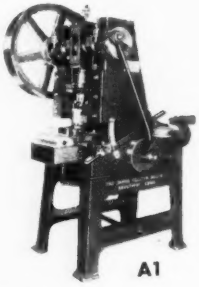
BRIDGEPORT, CONN.

For MORE than Half a Century the name COULTER has meant MORE in higher quality cuttings . . . MORE IN GREATER PRODUCTION.

**MODEL A-1**

Cutting Heels at high speed production or short runs.



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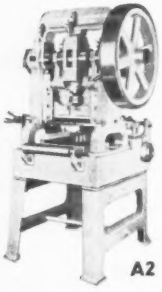


A2

**MODEL A-2**

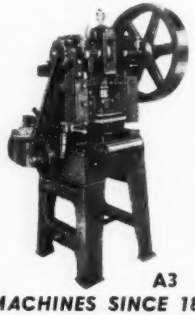
Cutting Multiple Heels, Half and Full Soles with stock grain.

**MODEL A-3**

Cutting Multiple Heels and Taps with or across stock grain.

**MODEL A-2s**
(Not illustrated)

Cutting across grain of stock.



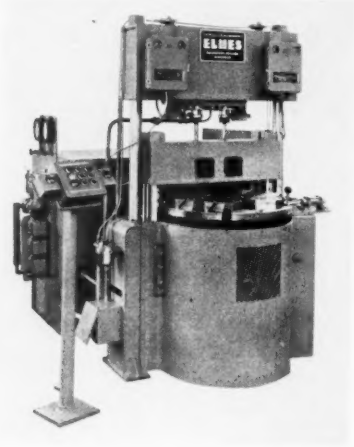
A3

*COULTER PRODUCTION MACHINES SINCE 1896*




## Elmes Hydraulic Transfer Press

A new hydraulic transfer press, specially designed for the molding of small rubber parts around metal inserts, is announced by Elmes Engineering Division of American Steel Foundries, 1150 Tennessee Avenue, Cincinnati 29, Ohio. Parts are produced at the rate of




20 units per two-minute cycle—10 units per minute—a substantial increase over previously used methods. This press is equipped with two transfer rams, each of 20 tons capacity. Moving-down die clamp has 60 tons capacity. Lower halves of die are mounted on a rotating 3-station table providing nearly continuous processing of material, permitting curing and unloading while material is being molded. The press has semi-automatic timed cycle controls, push-button operated, with inching features for all movements. The rotating table is mounted on a circular steam plate to maintain die temperature when dies are out of pressing position. The clamp is provided with a smaller steam plate. Automatic controls maintain constant temperature.

---

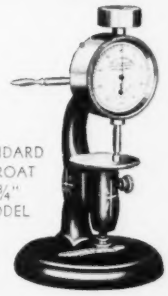
An entirely new theory in the high speed production shearing field is said to be incorporated in the **Di-Acro Vari-O-Speed Powershear,** now offered by the O'Neil-Irwin Manufacturing Co., Lake City, Minn. The cutting cycle of this new unit can be quickly adjusted to the very fastest speed at which the operator can feed the material for any given shearing operation, thereby providing maximum operator productivity as the necessity of engaging the clutch for each cutting stroke has been entirely eliminated. The cutting range of the unit extends from the lightest of materials in rubber, plastics, etc., to heavy gauges of aluminum, cobalt steel, stainless steel, etc.

---

General Electric Co., Schenectady, N. Y., is now offering its line of **Tri-Clad motors** equipped with Stearns magnetic brakes as unit apparatus. G. E. assumes unit responsibility for both brake and motor.

## RANDALL & STICKNEY

**THICKNESS GAUGES FOR RUBBER**



STANDARD THROAT 1¾" MODEL

**THROAT DEPTHS**
**1¾" to 26"**

**FOOT TENSIONS**
**supplied by Internal Spring or Direct Weights**

**FOOT DIAMETERS**
**⅛" to 1¼"**

**ROLLS**
**Table and Roll or two Rolls**

**RANGE**
**½" or 1", also 1 CM Metric**

26" DEEP THROAT MODEL

**SEND FOR CIRCULARS to Dept. A.**

**FRANK E. RANDALL CO., Inc.**
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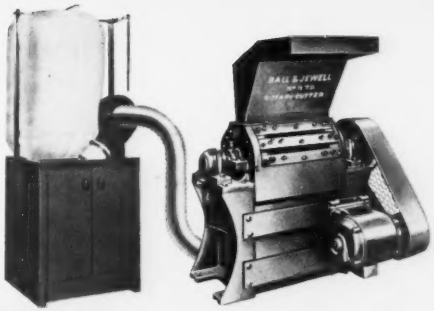

B&J

## No. ½ T. D. Grinder for Foam & Sponge Scrap Rubber

Minimum floor space—maximum utility. When equipped with B & J engineered air suction system, it has a 200 to 250 lbs. per hr. capacity of ⅜" granules. Available with 5½" x 20" throat.

For grinders with capacity of 50 to 3,000 lbs. per hr. Contact Ball & Jewell, Inc., 28 Franklin Street, Brooklyn 22, N. Y.

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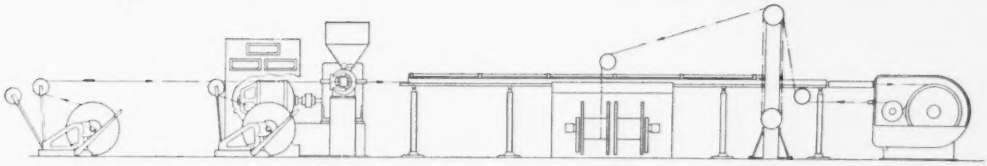
***B & J builds the answer to any grinding problem***



DAVIS-STANDARD THERMO-PLASTIC WIRE INSULATING EQUIPMENT

## COMPLETE EQUIPMENT FOR PLASTIC WIRE INSULATING

*A complete line of rubber and plastics extruders*

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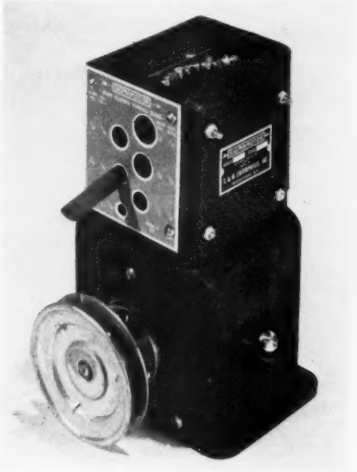
## Sigmamotor Laboratory Pump

Continuous liquid flow by means of a series of "fingers" that exert pressure on flexible tubing is provided in the Sigmamotor, a laboratory pumping unit manufactured by E & M Enterprises, Inc., Middleport, N. Y. There is no chance of contamination from metal parts or of

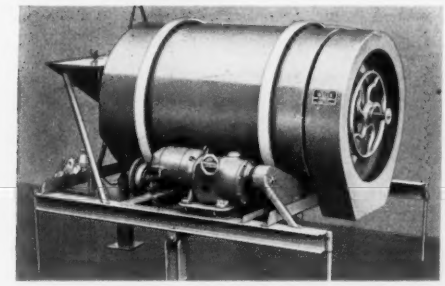


adverse corrosive effects from the fluid being handled, as the fluid flows only through the natural or synthetic rubber tubing and does not come in contact with any mechanical parts. Designed to pump liquids or gasses, the unit can handle solids in the solution. It will handle from 1½ to 30 gallons per hour without speed changes. If desired, the unit can handle a number of different fluids at the same time, entirely independent of each other. It can provide proportional and extremely small flows.

Cut Trouble?

SEE PAGE 132

# WILLS "SUB-ZERO" ROTARY TUMBLERS



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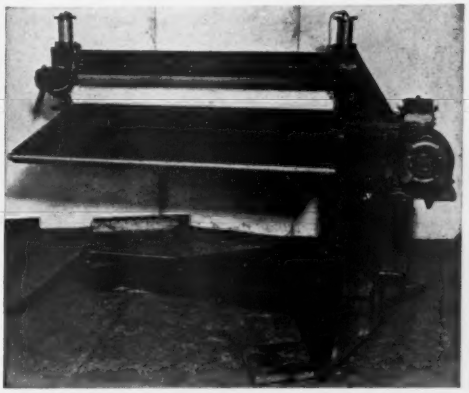
# UTILITY
**TRUCK TYPE**
# BAND BUILDER
**BUILT UP TO 60" WIDE**



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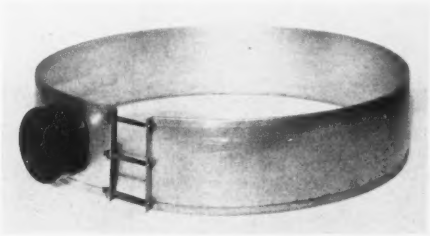

concentration through the heater's face is sufficiently low so as not to "coke" or burn the material content in most instances. The effective energy input without thermal insulation varies from 60 to 85% of the wattage input, depending upon the conduction with the drum and the heat absorbing qualities of the various materials.

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---

For mixing small laboratory batches of from 1 quart to 1½ gallons of material, a new **motor-driven laboratory change can mixer** has been developed by Charles Ross & Sons Co., Brooklyn, N. Y. It is reported to mix efficiently most varieties and consistencies of materials and is available in 1-gallon or 2-gallon capacity sizes.

---

A new line of **midget hydraulic pumping units,** available with either a 5-pint or a 3-gallon capacity reservoir, is being offered by the John Dusenbery Co., Inc., Verona, N. J. The reservoir is mounted on either an open, a totally enclosed, or an explosion-proof motor, and the pump, check valve and relief valve are enclosed.

---

Spray gun spurting, which often projects a blob of heavy industrial material upon coated surfaces, is said to be completely eliminated by the **Graco Mogul-Type Powerflo Pump,** a product of the Gray Co., Inc., Minneapolis 13, Minn. The pump is equipped with a device called the Evenflo which is reported to positively prevent spurting.

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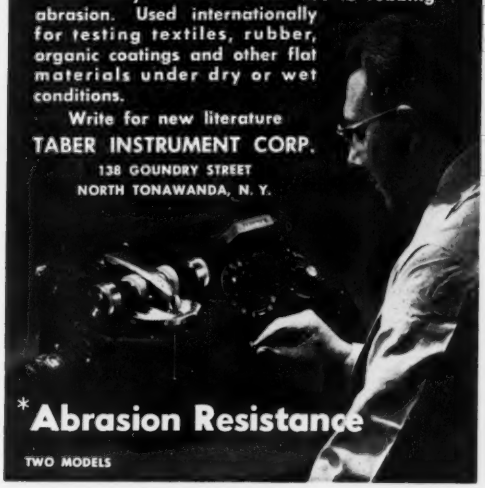

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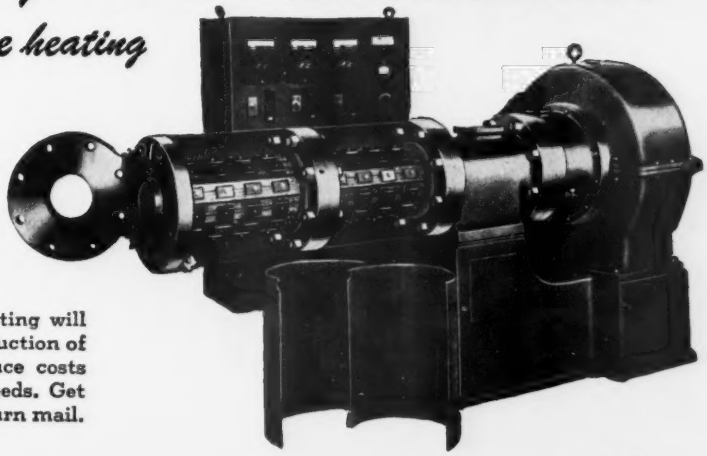

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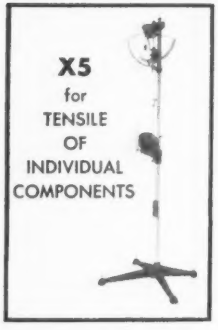


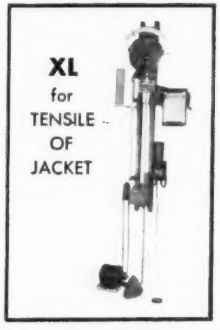


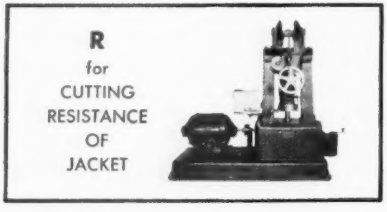


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# REVIEWS

## BOOKS

**Artificial Fibres.** By R. W. Moncrieff. Published by John Wiley & Sons, Inc., 440 Fourth Ave., New York 16, N. Y. 5½ x 8½ in. 314 pp. $4.50.

This book represents a thorough coverage of the artificial, synthetic or so-called man-made fibers, including the historical and background development, the more important manufacturing processes, the chemical and physical properties of the various fibers, and, finally, specific uses of the fibers discussed. The book is divided into five sections, the first treating with the structure and properties of the fibers, the next three dealing with specific types of fibers, such as the regenerated cellulosic, regenerated protein, and the synthetic fibers, and the last with processing methods. Among the brand-name fibers discussed are Tenasco, Durafil, Fortisan, Aralac, Vicara, Nylon, Perlon, Vinyon, Saran, Orlon, Polythene, and Plexon. Brief reference is made to rubber and some of the plastics. Suggestions for further reading are made at the end of each section.

•

**Costs, Budgeting & Economics of Industrial Research.** Edited by David B. Hertz. Published by Columbia University Press, 2960 Broadway, New York 27, N. Y. 5½ x 8½ in. 260 pp. $4.50.

The various papers delivered at the first Columbia Conference on Industrial Research, held in New York in June, 1950, have been collected in this book, as well as information gleaned from the informal clinic session which followed the presentation of these papers. The papers are by a highly qualified group of industrial and academic authorities in the field and, as indicated by the title, the topics cover the economics of industrial research. The scope of the book is evident from some of the topics discussed, such as exploratory research, the design of an integrated research program, transition to production, and research cost analysis and project evaluation. The book should prove of value to management in general.

•

**Manual on Quality Control of Materials.** Published by the American Society for Testing Materials, 1916 Race St., Philadelphia 3, Penna. 6 x 9 in. 100 pp. $1.75.

This manual, sponsored by A.S.T.M. Committee E-11 on Quality Control of Materials, replaces the widely used A.S.T.M. Manual on Presentation of Data. The new manual is organized in three parts, the first part essentially covering the presentation of data, the second presenting limits of uncertainty of an observed average, and the third explaining the control chart method of analysis and methods for presentation of data. The principles of the latter section are discussed largely in terms of the quality of materials and manufactured products. In view of the growing adoption of quality control methods in industry, this manual is most timely.

•

**Dynamic Motion and Time Study.** By James J. Gillespie. Published by the Chemical Publishing Co., 26 Court St., Brooklyn 2, N. Y. 5½ x 8½ in. 165 pp. $3.75.

Representing an entirely new approach to the study of motion and time, which has already been adopted by many companies, particularly in England, this book relates work activity to work psychology. The author's premise is that the workman is not a precision machine whose operation can be analyzed and speeded up on a strictly mathematical basis, but rather is an individual whose psychological reaction to his surroundings and his response to the group of which he is a member determines and influences his efficiency. This premise is enlarged upon and explained in the book, which includes 16 chapters, a list of references, an appendix and a subject index.

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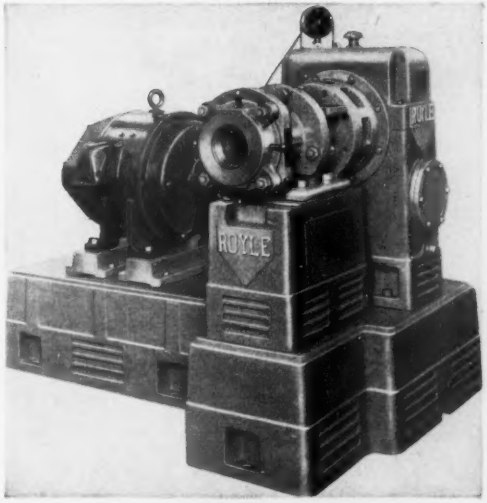


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## REVIEWS (CONT'D)

**Mobilizing Production for National Defense.** (Production Series No. 195). American Management Association, 330 West 42nd St., New York 18, N. Y. 6 x 9 in. 40 pp. $1.00 (members), $1.25 (non-members).

Three papers which were presented at the Production Conference of the American Management Association at Chicago, Ill., on December 11 and 12, 1950, together with a panel discussion on "A Mobilization Program for Production," are presented in this booklet. The papers included in the booklet are: "Production Control—Too Much or Too Little?" by W. W. Gilmore, president of the Micro Switch Division of the Minneapolis-Honeywell Regulator Co.; "Quality Control—Organization and Administration," by David C. Peterson, director of engineering and manufacturing of the Stewart-Warner Corp., and "Security Against Sabotage," by James R. Yore, director of the Security Division, Chicago Operations Office of the Atomic Energy Commission.

•

**Active Carbon.** By John W. Hassler. Published by the Chemical Publishing Co., 26 Court St., Brooklyn 2, N. Y. 5½ x 8½ in. 380 pp. $7.00.

Reported to be the first English text which attempts to cover all aspects of active carbon, this book includes methods of manufacture, theories and principles of action and use, industrial applications, and laboratory procedures for evaluation and for devising proper methods of use. The book is divided into three parts, the first devoted to a discussion of theoretical aspects, fundamental principles and properties, the second describing various applications, and the third dealing with experimental methods. In addition to a critical survey of the literature, the author has drawn on his own extensive experience as well as on the direct exchange of experiences with other research workers in the active carbon field. The book has 34 chapters in all, together with a subject index.

•

**Adjustable-Speed Calender Drives.** (GEA-5588). General Electric Co., Schenectady 5, N. Y. 8½ x 11 in. 8 pp.

This bulletin deals with G-E drives for calendering rubber, plastics and similar materials. Illustrated with many photographs and a series of charts and diagrams, it outlines the uses and advantages of the electronically-regulated drives. The bulletin includes dimensions and horsepower ratings of all G-E calender drive motors and motor-generator sets.

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*The following papers have been published in Vol. 26 Nos. 1-4 of the "Transactions I.R.I."*

"Rubber as an Engineering Material." Symposium papers and discussions.
"Natural Rubber: Its Properties as a Raw Material for the Manufacturing Industry." A. van Rossem.
"The Weber Test for Natural Rubber." H. J. Stern.
"Continuous Vulcanisation Processes." W. H. Reece.
"Neoprene Compounding." H. J. Lanning.
"Carbon Black Manufacture in Great Britain." Fred H. Amon.
"Abrasion Resistance and its Measurement." J. M. Buist.
"Stability of Compounded Latex." K. W. Hayes.
"Determination of Copper in Rubber Latex." F. C. J. Poulton and M. E. Tunnicliffe.
"Oxidation of Natural Rubber Hydrocarbon." L. Bateman.
"Continuous Vulcanisation with reference to Flooring, Belting, etc." J. M. Bierer.
"Determining the Dynamic Coefficient of Friction of Vulcanised Rubber." A. Boonstra.
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## BOOKLETS, CATALOGS, etc.

**Production Control in Manufacturing Industries.** (TM-596.) Management Controls Division, Remington Rand Inc., 315 Fourth Avenue, New York 10, N. Y. 9½ x 11¾ in. 40 pp.

Quick and accurate answers to production and inventory control questions are provided in this booklet. Efficient and accurate record-keeping management to assure continuous and uninterrupted production flow is high-lighted in the booklet. Punched card methods are shown for every phase of production control including engineering records and procedures, production and forecastings, materials controls scheduling and progress reports. Not only the general phases of production control are explained but also the major flow functions. The "how" of scheduling defense orders for regular as well as new productions without delay or disorganization, processing production orders according to schedule, accurate delivery dates based upon correct information on raw materials and machine facilities, are all covered.

•

**Vinylite Vinyl Acetate Resins.** Bakelite Division, Union Carbide and Carbon Corp., 300 Madison Avenue, New York 17, N. Y. 8½ x 11 in. 28 pp.

Latest data on forms, properties and applications for Vinylite acetate resins are provided in this booklet. Compiled as a technical reference source, it describes the advantages and limitations of many types of Vinylite vinyl acetate resins produced by the company. Both tables and text provide essential data on solution viscosity, toughness, film strength, compatibility and softening temperature for each type of resin. Under separate headings, acetate resins, alcohol-acetate resin solutions and acetate resin dispersions are discussed, with particular reference to their inherent qualities as bonding agents. Also included is detailed information on the preparation of these resins for adhesives and other commercial uses. In each case the formulation and methods of use are explained.

•

**Hercules Resins for Adhesives.** Synthetics Department, Hercules Powder Co., Wilmington, Del. 8½ x 11 in. 24 pp.

This booklet is a report on the contributions made by Hercules resins to film cohesion, surface tack, bond strength, and other properties of adhesives. As a means of showing the wide range of usefulness of the resins, a number are cited to show how they are used. Three broad adhesive types are covered in the booklet: rubber, cellulosics, and water-soluble. The examples themselves are an aid to the formulator in selecting a resin for use in a specific adhesive. The broad applicability of the resins in formulating adhesives to meet exacting demands is also suggested.

•

**Manual of Laboratory Safety.** Fisher Scientific Co., 717 Forbes St., Pittsburgh 19, Penna. 6 x 9 in. 40 pp.

This newly revised edition of the company's manual contains original material which has been brought up-to-date by the inclusion of recently developed data, techniques and equipment. The manual will prove to be useful in the implementation of complete laboratory safety programs. The original edition of this manual has been translated into many foreign languages and is widely used in laboratories throughout the world. Various drawings and photographs enhance its value.

•

**Steam Platen Presses.** (Bulletin No. 290.) Baldwin-Lima-Hamilton Corp., Philadelphia 42, Penna. 8½ x 11 in. 20 pp.

The different steam and platen presses produced by the company are described and illustrated in this bulletin. Standard presses ranging from 20 by 20 inches to 84 by 222 inches platen size and from 100 to 12,500 ton capacity are covered. Complete specifications are provided for each of the units, while the uses to which each may be put are discussed. Baldwin hydraulic accumulators and Triplex Pumps are also described and illustrated as accessory equipment to the operation of the presses.

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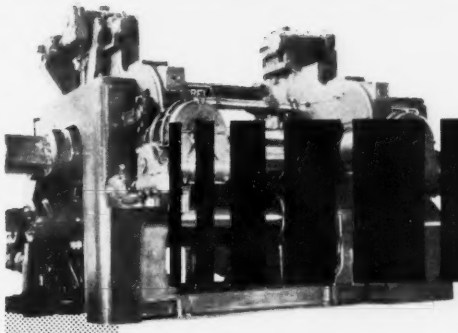

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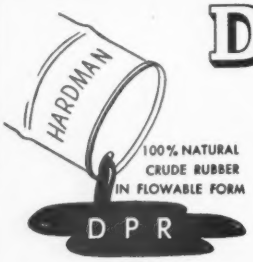


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**Rubber and Plastics Calenders.** (Bulletin No. 174). Farrel-Birmingham Co., Inc., Ansonia, Conn. 8½ x 11 in. 32 pp.

The company's complete line of calenders for processing rubber and plastics is described in this bulletin. Included in the contents are general specifications, recent design improvements, parts lists and drawings, a diagram of roll arrangements used in various kinds of production, and illustrations of over 30 calenders of different types and sizes. Also included are brief descriptions and illustrations of allied equipment, examples of specially engineered plant layouts, and illustrations of the company's process testing laboratory, where calenders and other processing equipment are installed and maintained for the use of manufacturers for carrying on experimental work.

•

**The Chemistry of Acrylonitrile.** Published by the American Cyanamid Co., 30 Rockefeller Plaza, New York 20, N. Y. 6 x 9¼ in. 96 pp.

The synthesis and physical and chemical properties of acrylonitrile are discussed in this book. The direct application of the compound, its polymers and copolymers in the formulation of adhesives, rubbers, plastics, fibers, insecticides and in the treatment of textiles, surface coatings, drilling muds, leather, paper and other important fields is also discussed in this book. It is illustrated with many photographs, drawings and charts and features an extensive bibliography.

•

**Barksdale Manual Valves.** (Catalog No. 1B-1). Barksdale Valves, 1566 East Slauson Avenue, Los Angeles 11, Calif. 8½ x 11 in. 48 pp.

This catalog covers the entire range of Barksdale shut-off, selector, and manipulator valves. It contains explanatory copy and illustrations of the patented "Shear-Seal" principle in which a pressure balanced, self-aligning, tubular valve seat maintains intimate contact with an optically flat porting disc. Included in the catalog is a simple outline for determining proper valve size.

•

**Whittaker Metallic Soaps.** Whittaker, Clark & Daniels, Inc., 260 West Broadway, New York 13, N. Y. 6 x 9½ in.

The applications of the company's comprehensive line of metallic soaps, including barium, magnesium, aluminum, calcium and zinc stearate and zinc palmitate, are described in this booklet. Tables show the analysis, physical properties and solubility of each product. An explanation of the analytical data is included.

Cut Trouble?

SEE PAGE 132

# BRATEX
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# MARKETS

***Rubber – Crude, Reclaimed and Scrap – Cotton – Ducks – Tire Fabrics – Sheetings***

## Natural Rubber

Natural rubber prices started, what most industry observers expected to be, a long descent as prices at Singapore were off as much as 9-13/32 pence and London lost as much as 8¾ pence during the past week. Most rubber men see the recession as a combination of many factors, but the British announcement that no more rubber will be sold to Red China this year was the final stroke.

The governments of Malaya and the Crown Colony of Singapore are expected to implement the British decision, but reports from Jakarta indicated that Indonesian rubber supplies will still be available to Communist buyers. A spokesman for the Indonesian foreign office declared that his country intends to continue selling rubber to any country, including Red China, that can send her needed goods.

Rubber men believe, however, that the effect of the British announcement and the workings of the U. S. rubber program will be sufficient to depress the price of natural rubber considerably. Decreased American consumption resulting from stepped-up synthetic output and toned-down production requirements have already been implemented by the "close-to-the-vest" buying practices of the General Services Administration, they pointed out.

Purchases for the U. S. stockpile so far this month, however, have been reported at an extremely heavy rate. Not only has the government been buying rubber against overnight bids, but it has also been taking part of the heavy offering during the day.

Government stockpile plus purchases-to-arrive must be very close to the 900,000 ton level, trade sources believe. The question arises whether the government will continue to stockpile above the million ton mark in face of the accelerated rate of synthetic production in the U. S. and the modest rate of natural consumption for civilian use.

### London Market

*(Standard Smoked Sheets)*

| | |
|---|---|
| June | 51.04 - 51.83 |
| July-September | 50.17 - 50.46 |

### Singapore Market

*(Standard Smoked Sheets)*

| | |
|---|---|
| June | 50.75 - 51.08 |

## Synthetic Rubber

*(Dry Types—Per Pound)*

| | |
|---|---|
| Butaprene NF | .465 - .475 |
| Butaprene NL | .475 - .485 |
| Butaprene NAA | .515 - .525 |
| Butaprene NXM | .550 - .560 |
| Chemigum 30N4NS | .400 - .470 |
| Chemigum 50N4NS | .400 - .470 |
| Chemigum N3 | .450 - .520 |
| GR-I | —— - .2075 |
| GR-S | —— - .245 |
| Hycar OR-25 | .450 - .460 |
| Hycar OR-15 | .520 - .530 |
| Hycar OS-10 | .500 - .510 |
| Neoprene Types CG and AC | —— - .500 |
| Neoprene Type E | —— - .650 |
| Neoprene Types FR and KNR | —— - .800 |
| Neoprene Type GN | —— - .380 |
| Neoprene Type GN-A | —— - .380 |
| Neoprene Type RT | —— - .400 |
| Neoprene Type S | —— - .380 |
| Neoprene Type W | —— - .400 |
| Paracril B | .500 - .510 |
| Paracril BJ | .500 - .510 |
| Paracril C | .580 - .590 |
| Silastic (compounded) | 2.35 - 4.40 |
| Thiokol Type A | .370 - .470 |
| Thiokol Type FA | .520 - .620 |
| Thiokol PR-1 | .750 - .850 |
| Thiokol Type ST | .750 - .850 |

***NEW YORK, MAY 10, 1951***

## Scrap Rubber

A strong demand has been noted in the scrap rubber market during the past period with actual trading being limited only by a lack of supplies. Dealers have reported difficulties in replenishing depleted stocks and collections are reported to be becoming more intensive. Demand was high for both tire and tube scrap, and reclaimers were said to be in the market for all available supplies of both red and black tubes. Scrap dealers are of the opinion that ceiling prices may soon be imposed on scrap rubber. Current quotations follow:

| | | |
|---|---|---|
| Mixed passenger tires | ton | $30.00 |
| Beadless truck tires | ton | 40.00 |
| Mixed truck tires | ton | 33.00 |
| Beadless passenger tires | ton | 37.00 |
| No. 1 passenger peelings | ton | 80.00 |
| No. 1 truck peelings | ton | 80.00 |
| Red passenger tubes | lb. | .20 |
| Black passenger tubes | lb. | .14 |
| Mixed tubes | lb. | .13 |
| No. 2 light colored truck tubes | lb. | .20 |
| Red truck tubes | lb. | .20 |
| Black truck tubes | lb. | .14 |
| Buffings | ton | 45.00 |

## Reclaimed Rubber

According to preliminary estimates by the Department of Commerce, 28,026 long tons of reclaimed rubber were consumed during February, against the 32,455 long tons consumed in the previous month. Production, however, remains at high levels. Industry members have been meeting with OPS officials to discuss the advisability of establishing specific ceilings for reclaim at the manufacturing level. Industry representatives were reported to believe that the general price ceiling regulation should be revised because of the current variance of prices throughout the industry. Current quotations follow:

***Tires***

| | | |
|---|---|---|
| Black, Digester (Natural) | lb. | .10½ - .11 |
| Peels No. 1 | lb. | .11 - .11½ |
| Whole Tire (Blend) | lb. | .10 - .10½ |

***Inner Tubes***

| | | |
|---|---|---|
| Black (Natural) | lb. | .24 - .25½ |
| Red (Natural) | lb. | .28 - .28½ |
| Butyl | lb. | .12½ - .13 |

## Cotton Tire Fabrics

Of late, supplies of cotton tire fabrics have been in extremely short supply with quantities barely sufficient to meet heavy military demands. Trade sources report that second-quarter production has been almost completely sold out. In view of the extremely tight market situation, most suppliers have continued their withdrawal from the market. Most mills have already allotted 80% of their production to rated orders, as called for by NPA Order M-53, March 31, 1951. Recent quotations follow:

| | | |
|---|---|---|
| Standard, Peeler, 12/4/2 | lb. | .95 |
| Extra Staple, Peeler, 12/4/2 | lb. | 1.00 |

## Chafers

| | | |
|---|---|---|
| 14.4 oz. (per sq. yard) | lb. | .86½ |
| 9.25 oz. (per sq. yard) | lb. | .83 |
| 11.65 oz. (per sq. yard) | lb. | .81 |
| 8.9 oz. (per sq. yard) | lb. | .83½ |

## Cotton

The market for middling uplands on the Commodity Exchange in New York has held at the price of 46.06c since our last report (April 10). There were 25 trading days in April. Cotton prices were steady during the past week despite continued favorable weather and indications that about 28,000,000 acres will be planted to cotton. Except for dryness in the Western Belt, the cotton crop is getting off to a good start.

Trade sources believe that legislation now before various committees in Congress may affect cotton prices in the future. Farm and retail interests are going to fight the continuation of controls after June 30, when the present law expires. Export bans on cotton are expected to be lifted as soon as the United States makes allocations for the new crop.

The feeling was growing in trade circles that the government's goal of 28,536,000 acres planted and a crop of 16,000,000 bales would be realized next season, and probably exceeded. If growers boost their acreage and if abandonment is in line with the average for the past five years, realization of a 16,000,000-bale output would mean that the 1951 output of each harvested acre would have to be about 275.8 pounds.

Exports of cotton by the United States for the past week were well above the previous week's figures and slightly higher than a year ago. Shipments through May 10 were placed at 150,000 bales, against 79,000 bales a week earlier and 143,000 bales in the like period a year ago. Exports for the current season through May 10 totaled 3,589,000 bales.

Quotations for middling uplands on the Exchange follow:

| | Apr. 9 | May 10 | | |
|---|---|---|---|---|
| | Close | High | Low | Close |
| May | 45.39 | 45.39 | 45.38 | 45.39 |
| July | 44.83 | 45.20 | 45.15 | 45.17 |
| Oct. | 39.72 | 39.46 | 39.36 | 39.45 |

***Government Selling Prices For Various Grades of Natural Rubber***

JANUARY 10 TO MAY 10

| Grade | Jan. 10 | Jan. 11 | Jan. 12-15 | Jan 16-May 10 |
|---|---|---|---|---|
| 1 R.S.S. | 71 | 71 | 68 | 66 |
| 2 R.S.S. | 70 | 69½ | 66¼ | 64¼ |
| 3 R.S.S. | 68⅞ | 68½ | 65½ | 63½ |
| 4 R.S.S. | 67½ | 67¼ | 64¼ | 62½ |
| 5 R.S.S. | 65½ | 65¼ | 62¼ | 60¼ |
| 1 Thin Latex | 73 | 73 | 70 | 68 |
| 2 Thin Latex | 72 | 72 | 69 | 67 |
| 1 Thick Latex | 73½ | 73 | 70 | 68 |
| 2 Thick Latex | 72 | 72 | 69 | 67 |
| 1 X Thin Brown | 67 | 67 | 64 | 62 |
| 2 X Thin Brown | 66 | 65¼ | 62½ | 60½ |
| 3 X Thin Brown | 64 | 63 | 60 | 59 |
| 1 Thin Brown | 63½ | 61½ | 58½ | 60 |
| 2 Thin Brown | 62½ | 60½ | 57½ | 58 |
| 3 Thin Brown | 61¼ | 59 | 56 | 56¼ |
| 4 Thin Brown | 59¾ | 57½ | 54½ | 55 |
| 2 Amber | 63½ | 61½ | 58½ | 60 |
| 3 Amber | 62½ | 60½ | 57¼ | 58 |
| 4 Amber | 61½ | 59 | 56 | 56¼ |
| 1 Smoked Blanket | 62½ | 60½ | 57½ | 58 |
| 2 Smoked Blanket | 62 | 59½ | 56½ | 57 |
| Flat Bark | 54 | 52 | 50 | 48 |

Note: The table above lists government selling prices for natural rubber since quotations were first made available on January 10, 1951. The original prices were the highest quoted. There was a modest reduction on the following day, and a sharp decline on the third day. Prices remained unchanged until January 16 when another decline was established. Government selling prices have remained unchanged since January 16.

*Rubber*

**natural**

**synthetic**

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Latex and Latex Compounds

*for all purposes*

# STATISTICS *Of Interest to the Rubber Industry*

## U. S. Imports and Re-Exports of Natural Rubber

| | GROSS IMPORTS | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Natural Rubber (Dry) | | | Natural Rubber (Latex) | | | Guayule | | | | RE-EXPORTS | | TOTAL NET IMPORTS |
| Year | Long Tons | Total Declared Value | Average Declared Value per pound Cents | Long Tons | Total Declared Value | Average Declared Value per pound Cents | Long Tons | Total Declared Value | Average Declared Value per pound Cents | Total Gross Imports Long Tons | Long Tons | Total Declared Value | Long Tons |
| 1936 | 467,064 | 152,072,496 | 14.54 | 19,852 | 6,659,899 | 14.98 | 1,229 | 286,552 | 10.41 | 488,145 | 12,581 | 4,488,223 | 475,564 |
| 1937 | 574,600 | 237,307,041 | 18.44 | 23,185 | 10,213,670 | 19.67 | 2,694 | 745,873 | 12.36 | 600,479 | 7,902 | 3,385,433 | 592,577 |
| 1938 | 397,640 | 125,373,864 | 14.08 | 11,944 | 4,168,127 | 15.58 | 2,508 | 628,886 | 11.19 | 412,092 | 5,652 | 1,799,124 | 406,440 |
| 1939 | 469,946 | 167,586,780 | 15.92 | 27,437* | 10,467,552 | 17.03 | 2,233 | 463,345 | 9.27 | 499,616 | 13,125 | 5,832,618 | 486,491 |
| 1940 | 781,202 | 303,308,823 | 17.33 | 33,789 | 14,593,466 | 19.28 | 3,633* | 758,007 | 9.31 | 818,624 | 7,060 | 3,197,136 | 811,564 |
| 1941 | 989,498 | 401,976,317 | 18.14 | 34,797* | 15,965,627 | 20.48 | 4,881 | 1,145,767 | 10.48 | 1,029,176 | 5,376 | 2,757,872 | 1,023,800 |
| 1942 | 266,276 | 112,537,426 | 18.87 | 10,646 | 5,630,667 | 23.61 | 5,523 | 1,660,792 | 13.42 | 282,445 | 10,856 | 5,913,386 | 271,589 |
| 1943 | 50,358 | 31,369,198 | 27.81 | 1,890 | 1,312,202 | 31.00 | 7,678* | 3,636,789 | 21.14 | 59,926 | 22,583 | 16,446,707 | 37,343 |
| 1944 | 103,847 | 73,908,549 | 31.77 | 3,091 | 2,092,211 | 30.99 | 6,701* | 3,351,233 | 22.33 | 113,639 | 9,739 | 8,712,695 | 103,900 |
| 1945 | 134,408 | 95,814,102 | 31.82 | 4,733 | 3,115,853 | 30.22 | 10,040 | 5,963,797 | 26.52 | 149,221 | 9,509 | 7,201,746 | 139,712 |
| 1946 | 366,415 | 222,552,939 | 27.12 | 8,421 | 5,843,085 | 29.14 | 5,344 | 2,859,246 | 23.89 | 380,180 | 7,711 | 5,331,954 | 372,469 |
| 1947 | 691,087 | 306,951,814 | 19.83 | 17,542 | 9,787,722 | 30.98 | 2,884 | 1,492,825 | 23.11 | 711,513 | 4,121 | 2,354,494 | 707,392 |
| 1948 | 702,293 | 290,849,177 | 18.49 | 32,745 | 9,820,080 | 24.93 | 302 | 71,330 | 10.53 | 735,340 | 6,672 | 3,259,324 | 728,668 |
| 1949 | 630,818 | 225,341,459 | 15.95 | 29,974 | 14,970,478 | 22.30 | .... | ..... | .... | 660,792 | 6,253 | 2,746,109 | 654,539 |
| 1950 | 751,966 | 418,794,962 | 24.85 | 51,627 | 39,717,410 | 34.34 | 740 | 254,331 | 14.54 | 803,593 | 8,640 | 6,832,821 | 794,953 |
| 1949: | | | | | | | | | | | | | |
| Nov. | 63,641 | 20,693,593 | 14.51 | 3,512 | 1,645,360 | 20.89 | .... | ..... | .... | 67,153 | 11 | 9,802 | 67,142 |
| Dec. | 63,982 | 20,770,607 | 14.49 | 3,952 | 1,860,525 | 21.02 | .... | ..... | .... | 67,394 | 689 | 295,362 | 67,245 |
| 1950: | | | | | | | | | | | | | |
| Jan. | 54,277 | 17,881,882 | 14.71 | 3,974 | 1,951,793 | 21.92 | .... | ..... | .... | 58,251 | 431 | 225,196 | 57,820 |
| Feb. | 50,022 | 17,373,658 | 15.51 | 3,336 | 1,608,163 | 21.52 | ... | ..... | .... | 53,358 | 558 | 252,013 | 52,800 |
| Mar. | 57,831 | 21,120,732 | 16.30 | 3,650 | 1,826,747 | 22.34 | .... | ..... | .... | 61,481 | 659 | 326,688 | 60,822 |
| Apr. | 72,418 | 27,412,444 | 16.89 | 4,395 | 2,199,149 | 22.34 | 175 | 47,117 | 12.02 | 76,988 | 639 | 340,781 | 76,349 |
| May | 56,804 | 21,822,118 | 17.15 | 3,183 | 1,904,513 | 26.71 | 200 | 58,948 | 13.16 | 60,187 | 597 | 289,551 | 59,590 |
| June | 73,806 | 31,525,162 | 19.07 | 3,965 | 2,294,158 | 25.83 | 105 | 33,651 | 14.31 | 77,876 | 625 | 322,008 | 76,451 |
| July | 53,245 | 27,256,854 | 20.11 | 4,225 | 2,710,430 | 28.64 | 70 | 26,836 | 17.11 | 57,540 | 683 | 381,650 | 56,857 |
| Aug. | 67,415 | 36,092,742 | 23.90 | 5,253 | 3,721,184 | 31.62 | 35 | 9,671 | 12.34 | 72,703 | 1,005 | 914,279 | 71,698 |
| Sept. | 55,981 | 36,724,072 | 29.23 | 5,117 | 4,369,707 | 38.12 | 55 | 15,148 | 12.34 | 61,153 | 879 | 798,935 | 60,274 |
| Oct. | 73,205 | 53,151,003 | 32.41 | 5,161 | 5,485,816 | 47.46 | 10 | 7,496 | 33.18 | 78,376 | 564 | 500,623 | 77,812 |
| Nov. | 68,462 | 62,121,636 | 40.51 | 4,456 | 6,227,022 | 56.71 | 29 | 21,618 | 33.46 | 72,947 | 604 | 724,050 | 72,343 |
| Dec. | 65,282 | 66,092,508 | 45.11 | 3,954 | 5,191,321 | 58.62 | 25 | 24,864 | 44.40 | 69,236 | 1,400 | 1,757,047 | 67,836 |
| 1951: | | | | | | | | | | | | | |
| Jan. | 84,864 | 90,707,863 | 47.72 | 7,502 | 10,283,208 | 61.18 | 88 | 84,977 | 43.01 | 93,366 | 819 | 1,150,246 | 92,547 |

Source: U. S. Department of Commerce. * Adjusted to agree with total gross imports.

Notes: (1) Figures for latex are on a dry weight basis. (2) Figures for re-exports include natural rubber (dry and latex) and guayule. (3) In the years 1940 through 1943, crepe sole rubber imports were reported under a separate classification. Such imports, which are included under natural rubber, dry above, were: 856,294 pounds, valued at $191,097 in 1940; 379,607 pounds, valued at $85,924 in 1941; 662,503 pounds, valued at $159,530 in 1942; and 21,653 pounds, valued at $5,215 in 1943.

## Natural Rubber
### (Including Latex and Guayule)

*(All Quantities in Long Tons)*

| Year | New Supply | Consumption | Re-Exports | Stocks On Hand at End of Period |
|---|---|---|---|---|
| 1936 | 488,145 | 575,000 | 12,581 | 223,000 |
| 1937 | 600,479 | 543,600 | 7,902 | 262,204 |
| 1938 | 411,983 | 437,031 | 5,652 | 231,500 |
| 1939 | 499,473 | 592,000 | 13,125 | 125,800 |
| 1940 | 818,243 | 648,500 | 7,060 | 288,864 |
| 1941 | 1,029,007 | 775,000 | 5,376 | 533,344 |
| 1942 | 282,653 | 376,791 | 10,856 | 422,714 |
| 1943 | 55,329 | 317,634 | 20,815 | 139,594 |
| 1944 | 107,834 | 144,113 | 9,665 | 92,650 |
| 1945 | 135,672 | 105,429 | 6,743 | 118,715 |
| 1946 | 400,687 | 277,597 | 4,338 | 237,467 |
| 1947 | 688,354 | 562,661 | 4,101 | 129,038 |
| 1948 | 735,227 | 627,332 | 6,673 | 141,541 |
| 1949 | 660,792 | 574,522 | 6,253 | 106,619 |
| 1950 | 804,143 | 720,268 | 8,644 | 91,434 |
| 1949: | | | | |
| Nov. | 67,152 | 52,093 | 701 | 99,208 |
| Dec. | 67,934 | 52,919 | 713 | 106,619 |
| 1950: | | | | |
| Jan. | 58,251 | 59,992 | 431 | 108,769 |
| Feb. | 53,393 | 56,580 | 558 | 104,477 |
| Mar. | 61,481 | 60,859 | 659 | 101,691 |
| Apr. | 76,998 | 57,914 | 639 | 106,124 |
| May | 60,699 | 63,813 | 597 | 100,776 |
| June | 77,876 | 63,333 | 625 | 99,457 |
| July | 61,660 | 61,402 | 683 | 93,653 |
| Aug. | 72,973 | 64,297 | 1,005 | 87,146 |
| Sept. | 61,148 | 61,281 | 879 | 87,409 |
| Oct. | 78,376 | 69,178 | 564 | 83,215 |
| Nov. | 73,393 | 51,340 | 604 | 81,658 |
| Dec. | 67,895 | 44,999 | 1,400 | 91,434 |
| 1951: | | | | |
| Jan. | 92,454 | 44,586 | 819 | 93,079 |
| Feb. | 55,017 | 37,473 | 552 | 87,433 |

Source: 1936-40, U. S. Department of Commerce; 1941 to date, Rubber Division, OMD, and Predecessor Agencies.

## U.S. Gross Imports of Balata, Jelutong, Gutta-Percha, etc.

*(All Quantities in Long Tons)*

| | Balata | | Jelutong | | Gutta-Percha & Other Guttas | |
|---|---|---|---|---|---|---|
| Year | Tons | Value | Tons | Value | Tons | Value |
| 1936 | 535 | 199,368 | 6,163 | 1,296,364 | 1,568 | 555,643 |
| 1937 | 354 | 151,344 | 7,109 | 2,017,786 | 1,122 | 440,894 |
| 1938 | 509 | 181,140 | 9,132 | 2,944,504 | 444 | 204,582 |
| 1939 | 694 | 265,553 | 6,640 | 1,603,418 | 1,740 | 539,255 |
| 1940 | 648 | 300,500 | 7,451 | 2,449,137 | 2,340 | 1,004,885 |
| 1941 | 924 | 489,514 | 8,821 | 2,954,001 | 1,783 | 607,025 |
| 1942 | 1,544 | 1,107,059 | 1,200 | 530,296 | 804 | 525,763 |
| 1943 | 1,047 | 708,701 | 35 | 14,840 | .... | ..... |
| 1944 | 1,012 | 660,805 | 88 | 45,578 | 10 | 4,999 |
| 1945 | 1,361 | 907,253 | .... | ..... | 36 | 21,970 |
| 1946 | 2,281 | 2,233,065 | 304 | 256,169 | 423 | 458,064 |
| 1947 | 1,982 | 2,276,531 | 2,878 | 1,496,887 | 392 | 779,591 |
| 1948 | 1,195 | 805,078 | 3,401 | 2,377,765 | 423 | 542,788 |
| 1949 | 1,391 | 814,554 | 1,043 | 834,978 | 197 | 189,021 |
| 1950 | 2,117 | 1,589,885 | 1,789 | 1,515,162 | 541 | 745,418 |
| 1949: | | | | | | |
| Oct. | 222 | 142,538 | 123 | 92,681 | 19 | 15,221 |
| Nov. | 77 | 68,678 | 160 | 89,806 | 34 | 28,559 |
| Dec. | 54 | 36,980 | 108 | 67,002 | 39 | 24,061 |
| 1950: | | | | | | |
| Jan. | 61 | 42,855 | 37 | 18,308 | 56 | 35,288 |
| Feb. | 42 | 24,040 | 162 | 123,570 | 30 | 20,291 |
| Mar. | 90 | 66,374 | 113 | 97,008 | 17 | 13,672 |
| Apr. | 68 | 45,844 | 246 | 211,744 | 30 | 23,369 |
| May | 78 | 50,093 | 114 | 103,796 | 69 | 86,151 |
| June | 143 | 74,936 | 120 | 104,123 | 49 | 112,902 |
| July | 109 | 53,480 | 118 | 101,258 | 64 | 87,284 |
| Aug. | 171 | 102,985 | 234 | 200,912 | 46 | 41,790 |
| Sept. | 119 | 102,475 | 175 | 146,493 | 37 | 59,004 |
| Oct. | 372 | 311,959 | 174 | 132,632 | 64 | 146,707 |
| Nov. | 735 | 588,135 | 214 | 183,907 | 51 | 102,599 |
| Dec. | 124 | 126,709 | 82 | 91,411 | 28 | 16,361 |
| 1951: | | | | | | |
| Jan. | 242 | 200,534 | 184 | 227,244 | 108 | 118,988 |

Source: U. S. Department of Commerce.

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| REFRACTIVE INDEX | 1.553 |
| DISTILLATION, °F | 560-730 |
| ODOR | Excellent |
| VISCOSITY, SSU @ 100°F | 240 |

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**PANAFLEX BN-1** is an economical, light-colored plasticizer for synthetic rubber—especially butadiene-acrylonitrile type.

This hydrocarbon plasticizer *completely* replaces dibutyl phthalate in nitrile rubbers—produces soft vulcanizates having high tensile, excellent elongation, and very low modulus. **PANAFLEX BN-1** plasticized stocks possess good ageing properties, superior electrical characteristics, and show good gasoline and oil resistance.

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*Pan American Refining Corp.*
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*Chemicals*

## Synthetic Rubber—Totals

### (GR-S, Neoprene, Butyl, and Buna N Types)

*(All Quantities in Long Tons)*

| Year | Production | Imports | Consumption | Exports | Stocks On Hand at End of Period |
|---|---|---|---|---|---|
| 1941 | 8,383 | ..... | 6,259 | 572 | 1,702 |
| 1942 | 22,434 | ..... | 17,651 | 1,419 | 4,612 |
| 1943 | 231,722 | ..... | 170,891 | 18,148 | 41,568 |
| 1944 | 762,630 | 11,043 | 566,670 | 104,266 | 142,927 |
| 1945 | 820,373 | 10,407 | 693,580 | 83,778 | 203,454 |
| 1946 | 740,026 | 7,709 | 761,699[a] | 72,920 | 114,963 |
| 1947 | 508,702 | 1,093 | 559,566 | 11,385 | 62,366 |
| 1948 | 488,343 | 15,671 | 442,072 | 4,874 | 115,111 |
| 1949 | 393,690 | 17,242 | 390,855 | 6,483 | 98,042 |
| 1950 | 476,184 | 25,722 | 538,289 | 7,652 | 52,758 |
| 1950: | | | | | |
| Sept. | 44,460 | 1,947 | 49,550 | 629 | 59,059 |
| Oct. | 44,525 | 1,584 | 54,507 | 667 | 51,751 |
| Nov. | 48,413 | 1,971 | 48,261 | 578 | 51,636 |
| Dec. | 52,199 | 1,603 | 53,364 | 747 | 52,758 |
| 1951: | | | | | |
| Jan. | 60,952 | 1,509 | 59,584 | 570 | 55,453 |
| Feb. | 56,399 | 1,149 | 52,861 | 615 | 58,236 |

Source: Rubber Division, OMD, and Predecessor Agencies.

Notes: (1) These figures are revised from time to time and the latest available issue should be consulted for the most accurate data. (2) Figures shown include the output of both government and privately-owned plants. (3) Figures for 1941 are estimated. [a] Includes year-end adjustment of 5,384 tons to cover non-reporting companies.

## Synthetic Rubber—By Type

*(All Quantities in Long Tons)*

### New Supply

| | GR-S (Buna S) | GR-M (Neoprene) | GR-I (Butyl) | Buna N Types | Total |
|---|---|---|---|---|---|
| 1943 | 182,259 | 33,603 | 1,373 | 14,487 | 231,722 |
| 1944 | 679,949 | 56,660 | 20,252 | 16,812 | 773,673 |
| 1945 | 724,859 | 45,672 | 52,378 | 7,871 | 830,780 |
| 1946 | 613,408 | 47,766 | 80,823 | 5,738 | 747,735 |
| 1947 | 408,858 | 31,495 | 62,824 | 6,618 | 509,795 |
| 1948 | 405,492 | 34,848 | 56,662 | 7,012 | 504,014 |
| 1949 | 310,599 | 35,215 | 54,046 | 11,072 | 410,932 |
| 1950 | 378,887 | 50,067 | 60,915 | 12,037 | 501,906 |

### Consumption

| | | | | | |
|---|---|---|---|---|---|
| 1943 | 131,977 | 26,205 | 304 | 12,405 | 170,891 |
| 1944 | 495,552 | 46,243 | 10,763 | 14,112 | 566,670 |
| 1945 | 600,145 | 42,394 | 43,012 | 8,029 | 693,580 |
| 1946 | 632,126 | 44,357 | 79,228 | 5,988 | 761,699 |
| 1947 | 448,589 | 37,703 | 68,838 | 4,536 | 559,666 |
| 1948 | 345,313 | 32,118 | 58,870 | 5,771 | 442,072 |
| 1949 | 299,420 | 31,753 | 50,855 | 8,827 | 390,855 |
| 1948 | 345,313 | 32,118 | 58,870 | 5,771 | 430,618 |
| 1949 | 299,420 | 31,753 | 50,855 | 8,827 | 397,139 |
| 1950 | 416,230 | 43,781 | 66,348 | 11,930 | 538,289 |

### Exports

| | | | | | |
|---|---|---|---|---|---|
| 1943 | 14,937 | 2,540 | 40 | 631 | 18,148 |
| 1944 | 98,380 | 4,799 | 530 | 557 | 104,266 |
| 1945 | 76,555 | 5,837 | 980 | 406 | 83,778 |
| 1946 | 68,763 | 2,642 | 495 | 797 | 72,697 |
| 1947 | 7,951 | 2,617 | 62 | 755 | 11,385 |
| 1948 | 1,093 | 2,875 | 21 | 885 | 4,874 |
| 1949 | 1,401 | 3,330 | 178 | 1,574 | 6,483 |
| 1950 | 900 | 4,826 | 31 | 1,895 | 7,652 |

### Stocks at End of Period

| | | | | | |
|---|---|---|---|---|---|
| 1943 | 30,975 | 6,415 | 1,033 | 3,145 | 41,568 |
| 1944 | 116,130 | 11,739 | 9,892 | 5,166 | 142,927 |
| 1945 | 170,571 | 9,703 | 18,378 | 4,802 | 203,454 |
| 1946 | 81,483 | 10,470 | 19,478 | 3,755 | 115,186 |
| 1947 | 40,606 | 5,237 | 13,184 | 3,339 | 62,366 |
| 1948 | 96,282 | 5,072 | 10,995 | 2,762 | 115,111 |
| 1949 | 77,731 | 4,654 | 12,224 | 3,433 | 98,042 |
| 1950 | 36,942 | 5,733 | 7,243 | 2,840 | 52,758 |

Source: Rubber Division, OMD, and Predecessor Agencies.

Notes: (1) These figures are revised from time to time and the latest available issue should be consulted for the most accurate data. (2) Figures for GR-M and Buna N Types include production of privately-owned plants.

## Gasoline Consumption

*(In Thousands of Barrels of 42 Gallons)*

| | 1944 | 1945 | 1946 | 1947 | 1948 | 1949 | 1950 | 1951 |
|---|---|---|---|---|---|---|---|---|
| Jan. | 47,540 | 52,008 | 51,746 | 57,057 | 61,308 | 63,125 | 66,908 | 80,554 |
| Feb. | 47,754 | 48,856 | 47,654 | 50,551 | 56,487 | 57,980 | 63,366 | 72,916 |
| Mar. | 52,263 | 55,364 | 56,703 | 59,947 | 68,171 | 73,282 | 78,739 | ..... |
| Apr. | 50,005 | 59,024 | 62,111 | 64,140 | 72,183 | 75,318 | 80,348 | ..... |
| May | 54,230 | 60,748 | 66,800 | 70,865 | 77,186 | 81,665 | 89,033 | ..... |
| June | 54,266 | 60,580 | 63,247 | 71,329 | 78,044 | 83,374 | 90,010 | ..... |
| July | 55,119 | 60,170 | 60,076 | 73,441 | 81,428 | 82,129 | 91,707 | ..... |
| Aug. | 55,618 | 70,058 | 66,729 | 72,089 | 80,351 | 84,707 | 94,537 | ..... |
| Sept. | 56,318 | 64,529 | 62,268 | 71,384 | 76,159 | 80,832 | 86,766 | ..... |
| Oct. | 53,154 | 55,708 | 66,637 | 73,277 | 75,164 | 79,327 | 89,126 | ..... |
| Nov. | 54,967 | 53,543 | 61,345 | 64,158 | 72,560 | 76,746 | 82,718 | ..... |
| Dec. | 52,250 | 49,745 | 61,101 | 67,506 | 72,162 | 75,628 | 80,994 | ..... |
| Total | 633,482 | 696,333 | 735,417 | 795,015 | 871,270 | 913,713 | 994,412 | ..... |

Source: U. S. Bureau of Mines.

## Reclaimed Rubber

### (Including Natural and Synthetic)

*(All Quantities in Long Tons)*

| Year | Production | Consumption—Tons | Consumption—% to Crude [a] | Exports | Stocks On Hand at End of Period |
|---|---|---|---|---|---|
| 1936 | 150,571 | 141,486 | 24.6 | 7,085 | 19,000 |
| 1937 | 185,033 | 162,000 | 29.8 | 13,233 | 28,800 |
| 1938 | 122,400 | 120,800 | 27.6 | 7,403 | 23,000 |
| 1939 | 186,000 | 170,000 | 28.7 | 12,611 | 25,250 |
| 1940 | 208,971 | 190,244 | 29.3 | 11,347 | 32,636 |
| 1941 | 274,202 | 251,231 | 32.2 | 13,851 | 41,750 |
| 1942 | 286,007[b] | 254,820 | 64.6 | 30,405 | 42,532 |
| 1943 | 304,058[c] | 291,082 | 59.6 | 15,678 | 46,201 |
| 1944 | 260,631[d] | 251,083 | 35.3 | 11,800 | 43,832 |
| 1945 | 243,309 | 241,036 | 30.2 | 13,413 | 28,155 |
| 1946 | 295,612 | 275,410 | 26.5 | 14,461 | 33,666 |
| 1947 | 291,395 | 288,395 | 24.8 | 14,556 | 35,943 |
| 1948 | 266,861 | 261,113 | 24.4 | 11,428 | 32,630 |
| 1949 | 224,029 | 226,679 | 22.5 | 10,637 | 28,263 |
| 1950 | 314,008 | 303,733 | 24.1 | 11,740 | 35,708 |
| 1950: | | | | | |
| May | 24,879 | 24,158 | 21.9 | 881 | 27,837 |
| June | 25,960 | 25,253 | 22.7 | 889 | 28,470 |
| July | 24,347 | 23,377 | 22.2 | 864 | 30,371 |
| Aug. | 27,640 | 26,151 | 22.8 | 900 | 31,793 |
| Sept. | 29,749 | 29,250 | 26.4 | 1,177 | 33,395 |
| Oct. | 32,710 | 32,785 | 26.5 | 989 | 33,530 |
| Nov. | 30,265 | 30,260 | 31.3 | 1,237 | 33,960 |
| Dec. | 32,632 | 29,905 | 30.4 | 1,241 | 35,708 |
| 1951: | | | | | |
| Jan. | 33,044 | 32,455 | 31.0 | 1,336 | 35,543 |
| Feb. | 33,337 | 28,026 | 30.9 | 1,629 | 37,260 |

Source: 1936-40, Department of Commerce; 1941 to date, Rubber Division, OMD, and Predecessor Agencies.

Notes: (1) These figures are revised from time to time and the latest available issue should be consulted for the most accurate data. [a] Includes natural and synthetic rubber. [b] Includes 893 tons of imports. [c] Includes 67 tons of imports. [d] Includes 21 tons of imports.

## Automobile Production in U. S.

### (Civilian Production Only)

| Year | Passenger Cars | Trucks | Total | Year | Passenger Cars | Trucks | Total |
|---|---|---|---|---|---|---|---|
| 1931 | 1,973,090 | 416,648 | 2,389,738 | 1941 | 3,744,500 | 875,381 | 4,619,681 |
| 1932 | 1,135,491 | 235,187 | 1,370,678 | 1942 | 220,814 | 133,083 | 353,897 |
| 1933 | 1,573,512 | 346,545 | 1,920,057 | 1943 | 0 | 4,501 | 4,501 |
| 1934 | 2,177,919 | 575,192 | 2,753,111 | 1944 | 0 | 124,819 | 124,819 |
| 1935 | 3,252,244 | 694,690 | 3,946,934 | 1945 | 83,792 | 313,643 | 397,435 |
| 1936 | 3,669,528 | 781,862 | 4,451,390 | 1946 | 2,148,699 | 930,760 | 3,079,459 |
| 1937 | 3,915,889 | 892,382 | 4,808,271 | 1947 | 3,558,178 | 1,220,634 | 4,778,812 |
| 1938 | 2,000,985 | 485,852 | 2,486,837 | 1948 | 3,909,270 | 1,363,856 | 5,273,126 |
| 1939 | 2,866,796 | 704,308 | 3,571,104 | 1949 | 5,108,841 | 1,123,736 | 6,232,577 |
| 1940 | 3,692,328 | 721,637 | 4,413,965 | 1950 | 6,665,836 | 1,332,263 | 7,998,099 |
| **1950:** | | | | | | | |
| Jan. | 487,824 | 93,323 | 581,147 | July | 595,067 | 111,028 | 706,095 |
| Feb. | 385,361 | 89,971 | 475,332 | Aug. | 682,782 | 134,853 | 817,635 |
| Mar. | 469,618 | 110,843 | 580,461 | Sept. | 616,827 | 105,562 | 722,389 |
| Apr. | 455,193 | 103,850 | 559,043 | Oct. | 651,169 | 108,815 | 723,984 |
| May | 575,518 | 120,963 | 696,481 | Nov. | 504,445 | 98,538 | 602,983 |
| June | 720,688 | 135,332 | 856,020 | Dec. | 521,371 | 118,890 | 640,261 |
| 1951: | | | | | | | |
| Jan. | 478,589 | 127,583 | 606,172 | July | ..... | ..... | ..... |
| Feb. | 505,865 | 111,935 | 617,800 | Aug. | ..... | ..... | ..... |
| Mar. | 617,399 | 136,794 | 754,193 | Sept. | ..... | ..... | ..... |
| Apr. | ..... | ..... | ..... | Oct. | ..... | ..... | ..... |
| May | ..... | ..... | ..... | Nov. | ..... | ..... | ..... |
| June | ..... | ..... | ..... | Dec. | ..... | ..... | ..... |

Source: Automobile Manufacturers Association.

Note: Figures are based on factory sales. Revisions are made from time to time in these figures and the latest issue should be consulted for accuracy.

## Rim Production

| | 1946 | 1947 | 1948 | 1949 | 1950 |
|---|---|---|---|---|---|
| Passenger Car | 15,058,469 | 21,346,004 | 23,842,796 | 27,715,344 | 35,096,404 |
| Truck & Bus | 5,939,244 | 7,737,353 | 6,920,231 | 4,238,174 | 6,625,129 |
| Agricultural | 1,735,992 | 2,633,699 | 3,140,882 | 2,695,430 | 2,853,483 |
| Earth Mover | 5,520 | 10,610 | 13,330 | 9,895 | 15,602 |
| Total | 22,739,225 | 31,727,666 | 33,917,239 | 34,658,843 | 44,590,618 |

| | 1950 | | | 1951 | | |
|---|---|---|---|---|---|---|
| | Oct. | Nov. | Dec. | Jan. | Feb. | Mar. |
| Passenger Car | 3,558,060 | 2,812,285 | 2,508,918 | 2,741,867 | 2,667,575 | 3,400,462 |
| Truck & Bus | 612,015 | 511,990 | 587,197 | 620,562 | 515,761 | 633,837 |
| Agricultural | 172,224 | 207,037 | 261,427 | 306,524 | 265,807 | 2,207 |
| Earth Mover | 1,798 | 911 | 1,893 | 1,751 | 4,152 | 3,658 |
| Total | 4,344,097 | 3,532,223 | 3,359,435 | 3,670,704 | 3,453,295 | 4,348,001 |

Source: The Tire & Rim Association, Inc.

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## Automotive Pneumatic Casings

*(Thousands of Units)*

| | Shipments: Original Equipment | Shipments: Replacement | Shipments: Export | Shipments: Total | Production | Inventory End of Period |
|---|---|---|---|---|---|---|
| **1938 (total)** | **11,516** | **30,567** | **1,049** | **43,132** | **40,907** | **8,451** |
| Passenger Car. | 10,086 | 27,104 | 580 | 37,770 | 35,789 | 6,937 |
| Truck and Bus | 1,430 | 3,463 | 469 | 5,362 | 5,118 | 1,514 |
| **1939 (total)** | **18,208** | **38,022** | **1,279** | **57,509** | **57,613** | **8,665** |
| Passenger Car. | 15,742 | 33,471 | 607 | 49,820 | 49,933 | 7,108 |
| Truck and Bus | 2,466 | 4,551 | 672 | 7,689 | 7,680 | 1,557 |
| **1940 (total)** | **22,252** | **35,346** | **1,176** | **58,774** | **59,186** | **9,127** |
| Passenger Car. | 19,560 | 30,903 | 411 | 50,874 | 50,965 | 7,270 |
| Truck and Bus | 2,692 | 4,443 | 765 | 7,900 | 8,221 | 1,857 |
| **1941 (total)** | **24,780** | **39,895** | **1,489** | **66,164** | **61,540** | **4,436** |
| Passenger Car. | 19,855 | 34,119 | 586 | 54,560 | 50,392 | 3,165 |
| Truck and Bus | 4,925 | 5,776 | 903 | 11,604 | 11,148 | 1,271 |
| **1942 (total)** | **6,680** | **8,872** | **207** | **15,759** | **15,351** | **6,247** |
| Passenger Car. | 910 | 2,734 | 38 | 3,682 | 2,790 | 4,432 |
| Truck and Bus | 5,770 | 6,138 | 169 | 12,077 | 12,561 | 1,815 |
| **1943 (total)** | **6,128** | **18,547** | **225** | **24,900** | **20,423** | **1,883** |
| Passenger Car. | 82 | 10,606 | 71 | 10,759 | 7,620 | 1,132 |
| Truck and Bus | 6,046 | 7,941 | 154 | 14,141 | 12,803 | 751 |
| **1944 (total)** | **6,654** | **26,439** | **263** | **33,356** | **33,446** | **2,013** |
| Passenger Car. | 208 | 18,330 | 130 | 18,668 | 18,819 | 1,218 |
| Truck and Bus | 6,446 | 8,109 | 133 | 14,688 | 14,627 | 795 |
| **1945 (total)** | **5,984** | **36,479** | **504** | **42,967** | **44,524** | **3,077** |
| Passenger Car. | 1,115 | 25,463 | 222 | 26,800 | 28,200 | 2,214 |
| Truck and Bus | 4,869 | 11,016 | 282 | 16,167 | 16,324 | 863 |
| **1946 (total)** | **15,310** | **65,490** | **1,512** | **82,312** | **82,298** | **2,448** |
| Passenger Car. | 11,086 | 54,684 | 653 | 66,423 | 66,466 | 1,763 |
| Truck and Bus | 4,224 | 10,806 | 859 | 15,889 | 15,832 | 685 |
| **1947 (total)** | **25,056** | **62,871** | **3,256** | **91,183** | **95,550** | **6,949** |
| Passenger Car. | 19,644 | 52,857 | 1,608 | 74,109 | 77,795 | 5,444 |
| Truck and Bus | 5,412 | 10,014 | 1,648 | 17,074 | 17,755 | 1,505 |
| **1948 (total)** | **26,845** | **49,148** | **1,787** | **77,781** | **81,314** | **10,698** |
| Passenger Car. | 21,589 | 41,295 | 656 | 63,540 | 66,738 | 8,773 |
| Truck and Bus | 5,256 | 7,853 | 1,132 | 14,241 | 14,576 | 1,925 |
| **1949 (total)** | **31,584** | **43,466** | **1,467** | **76,517** | **76,369** | **10,638** |
| Passenger Car. | 28,129 | 36,440 | 509 | 65,077 | 65,140 | 8,904 |
| Truck and Bus | 3,456 | 7,026 | 958 | 11,440 | 11,228 | 1,734 |
| **1950 (total)** | **41,349** | **56,808** | **1,430** | **99,587** | **92,754** | **3,794** |
| Passenger Car. | 36,678 | 47,103 | 642 | 84,423 | 78,598 | 3,050 |
| Truck and Bus | 4,671 | 9,705 | 788 | 15,164 | 14,156 | 743 |
| 1951: | | | | | | |
| Jan. (total) | 3,035 | 3,812 | 114 | 6,961 | 6,764 | 3,552 |
| Passenger Car. | 2,593 | 3,062 | 53 | 5,707 | 5,433 | 2,748 |
| Truck and Bus | 443 | 750 | 62 | 1,254 | 1,331 | 803 |
| Feb. (total) | 3,002 | 3,058 | 114 | 6,174 | 5,887 | 3,307 |
| Passenger Car. | 2,601 | 2,320 | 48 | 4,969 | 4,698 | 2,502 |
| Truck and Bus | 400 | 738 | 66 | 1,205 | 1,189 | 800 |
| Mar. (total) | 3,620 | 3,493 | 123 | 7,235 | 6,693 | 2,804 |
| Passenger Car. | 3,125 | 2,605 | 54 | 5,784 | 5,298 | 2,055 |
| Truck and Bus | 495 | 888 | 69 | 1,451 | 1,395 | 749 |

Source: The Rubber Manufacturers Association, Inc.

## Cotton, Rayon and Nylon Tire Fabrics

*(Production in Thousands of Pounds)*

| | Cotton: Tire Cord Not Woven | Cotton: Cord Fabric Woven | Cotton: Chafer and All Other Tire Fabrics | Cotton: Total | Rayon and Nylon[b]: Tire Cord Not Woven | Rayon and Nylon[b]: Tire Cord And Other Tire Fabrics | Rayon and Nylon[b]: Total |
|---|---|---|---|---|---|---|---|
| **1947:** | | | | | | | |
| **Jan.-Mar.** | **21,972** | **49,377** | **21,815** | **93,164** | **5,322** | **52,059** | **57,381** |
| **Apr.-June** | **23,491** | **53,746** | **16,480** | **93,717** | **5,486** | **47,360** | **52,846** |
| **July-Sept.** | **15,571** | **44,291** | **14,596** | **74,458** | **6,161** | **51,719** | **57,880** |
| **Oct.-Dec.** | **18,183** | **48,532** | **17,762** | **84,477** | **6,550** | **55,078** | **61,628** |
| **Total** | **79,217** | **195,946** | **70,653** | **345,816** | **23,519** | **206,216** | **229,735** |
| **1948:** | | | | | | | |
| **Jan.-Mar.** | **18,546** | **50,251** | **19,391** | **88,188** | **a** | **60,569** | **60,569** |
| **Apr.-June** | **15,585** | **45,385** | **18,213** | **79,183** | **a** | **59,759** | **59,759** |
| July-Sept. | 29,743 | 45,927 | *c* | 75,670 | *a* | 63,642 | 63,642 |
| Oct.-Dec. | 13,321 | 34,424 | 15,879 | 63,624 | *a* | 65,258 | 65,258 |
| Total | 77,195 | 175,987 | 53,483 | 306,665 | ..... | 249,228 | 249,228 |
| **1949:** | | | | | | | |
| Jan.-Mar. | *d* | 33,213 | 25,395 | 56,608 | *a* | 68,296 | 68,926 |
| Apr.-June | 5,309 | 29,114 | 13,617 | 48 040 | *a* | 68,269 | 68,269 |
| July-Sept. | 1,343 | 16,620 | 11,141 | 29,104 | 15,640 | 55,969 | 71,609 |
| Oct.-Dec. | 180 | 17,650 | 11,886 | 29,716 | 12,967 | 58,890 | 72,857 |
| Total | 6,832 | 96,597 | 62,039 | 163,468 | 28,607 | 251,424 | 281,661 |
| 1950: | | | | | | | |
| Jan.-Mar. | 3,939 | 19,210 | 12,948 | 36,097 | 12,469 | 60,981 | 73,450 |
| Apr.-June | 11,077 | 29,498 | 14,071 | 54,646 | 11,510 | 59,966 | 71,476 |
| July-Sept. | 10,529 | 39,792 | 15,101 | 65,152 | 13,161 | 61,614 | 74,775 |
| Oct.-Dec. | 13,314 | 37,759 | 14,405 | 65,578 | 12,942 | 63,399 | 76,341 |
| Total | 38,859 | 126,259 | 56,525 | 221,473 | 50,082 | 245,960 | 296,476 |

Source: U. S. Bureau of the Census.

Notes: (a) Included with tire cord and fabrics to avoid disclosures of operations of individual mills. (b) Fuel cell fabrics are not included with rayon and nylon tire cord and fabrics. (c) Included with tire cord not woven. (d) Included with chafer and all other tire fabrics.

## Automotive Inner Tubes

*(Thousands of Units)*

| | Shipments: Original Equipment | Shipments: Replacement | Shipments: Export | Shipments: Total | Production | Inventory End of Period |
|---|---|---|---|---|---|---|
| 1938 | 11,515 | 28,134 | 644 | 40,293 | 37,848 | 8,166 |
| 1939 | 18,190 | 31,998 | 1,002 | 51,190 | 50,649 | 7,036 |
| 1940 | 22,172 | 29,070 | 972 | 52,214 | 52,237 | 7,017 |
| 1941 | 24,722 | 33,749 | 1,232 | 59,703 | 57,433 | 4,686 |
| 1942 | 6,895 | 7,213 | 159 | 14,267 | 12,685 | 6,206 |
| 1943 | 6,350 | 12,474 | 189 | 19,014 | 15,014 | 2,626 |
| 1944 | 6,460 | 20,569 | 196 | 27,224 | 27,488 | 2,813 |
| 1945 | 5,988 | 33,906 | 411 | 40,304 | 41,742 | 3,627 |
| 1946 | 15,327 | 59,357 | 1,424 | 76,108 | 77,251 | 3,820 |
| 1947 | 25,046 | 46,560 | 2,483 | 74,088 | 79,181 | 8,059 |
| 1948 | 26,833 | 40,548 | 1,119 | 68,499 | 70,033 | 9,641 |
| 1949 | 31,521 | 31,450 | 887 | 63,858 | 65,114 | 10,657 |
| 1950 | 41,240 | 42,671 | 811 | 84,723 | 80,179 | .... |
| 1950: | | | | | | |
| Dec. | 3,247 | 3,089 | 87 | 6,423 | 6,111 | 6,608 |
| 1951: | | | | | | |
| Jan. | 3,039 | 3,487 | 69 | 6,595 | 5,950 | 5,852 |
| Feb. | 3,000 | 2,842 | 68 | 5,910 | 5,144 | 5,154 |
| Mar. | 3,624 | 2,896 | 73 | 5,593 | 5,828 | 4,595 |

Source: The Rubber Manufacturers Association, Inc.

## Smoked Sheets—Spot Closing Prices

*(New York Market—Cents per pound)*

| Year | High | Low | Avg. | Year | High | Low | Avg. |
|---|---|---|---|---|---|---|---|
| 1910 | 288 | 141 | 206.60 | 1931 | 8⅝ | 4⅛ | 6.17 |
| 1911 | 184 | 114 | 141.30 | 1932 | 4¾ | 2½ | 3.49 |
| 1912 | 140 | 108 | 121.60 | 1933 | 9⅛ | 2⅜ | 5.96 |
| 1913 | 113 | 59 | 82.04 | 1934 | 15⅜ | 8¾ | 12.92 |
| 1914 | 93 | 56 | 65.33 | 1935 | 13¾ | 10⅝ | 12.37 |
| 1915 | 79 | 58½ | 65.85 | 1936 | 23 | 13½ | 16.41 |
| 1916 | 102 | 55 | 72.50 | 1937 | 26⅞ | 14 | 19.39 |
| 1917 | 90 | 52 | 72.23 | 1938 | 17⅛ | 10¾ | 14.64 |
| 1918 | 70 | 40 | 60.15 | 1939 | 24 | 14⅜ | 17.57 |
| 1919 | 57 | 38½ | 48.70 | 1940 | 24 | 18¼ | 20.10 |
| 1920 | 56½ | 16 | 36.30 | 1941 | 24⅜ | 19⅛ | 22.40 |
| 1921 | 21¾ | 11½ | 16.36 | 1942 | 22½ | 22½ | 22.50 |
| 1922 | 28⅜ | 13⅜ | 17.50 | 1943 | 22½ | 22½ | 22.50 |
| 1923 | 37⅛ | 24¾ | 29.45 | 1944 | 22½ | 22½ | 22.50 |
| 1924 | 40⅝ | 17⅜ | 26.20 | 1945 | 22½ | 22½ | 22.50 |
| 1925 | 121 | 34⅜ | 72.46 | 1946 | 22½ | 22½ | 22.50 |
| 1926 | 88½ | 36¾ | 48.50 | 1947 | 25 | 14 | 20.00 |
| 1927 | 41¾ | 33 | 37.72 | 1948 | 25 | 18 | 21.99 |
| 1928 | 41¾ | 17 | 22.48 | 1949 | 19¾ | 15⅜ | 17.57 |
| 1929 | 26⅜ | 15½ | 20.55 | 1950 | 86 | 18 | 41.10 |
| 1930 | 16½ | 7½ | 11.98 | | | | |

Note: Price was fixed by Government on August 6, 1941, at 22½c a pound for non-war uses. Free trading was resumed May 1, 1947.

## Spot Closing Cotton Prices

*(Middling Upland Grade—New York Market—in Cents)*

**Average Monthly Price Per Pound**

| | 1944 | 1945 | 1946 | 1947 | 1948 | 1949 | 1950 | 1951 |
|---|---|---|---|---|---|---|---|---|
| Jan. | 20.76 | 22.36 | 25.49 | 32.58 | 36.09 | 33.37 | 31.89 | 45.04 |
| Feb. | 21.34 | 22.29 | 26.57 | 33.91 | 33.63 | 33.41 | 32.79 | (a) |
| Mar. | 21.65 | 22.43 | 27.52 | 35.89 | 35.04 | 33.44 | 32.65 | 46.06 |
| Apr. | 21.71 | 21.88 | 28.40 | 35.89 | 38.10 | 33.84 | 33.23 | 46.06 |
| May | 21.63 | 23.30 | 28.17 | 36.51 | 38.57 | 33.73 | 33.64 | .... |
| June | 23.31 | 23.42 | 29.89 | 37.83 | 38.12 | 33.56 | 34.61 | .... |
| July | 22.33 | 23.27 | 34.11 | 38.03 | 34.89 | 32.99 | 38.11 | .... |
| Aug. | 22.11 | 23.10 | 36.31 | 34.83 | 32.23 | 32.06 | 38.93 | .... |
| Sept. | 22.10 | 23.25 | 37.59 | 32.21 | 31.92 | 30.94 | 41.62 | .... |
| Oct. | 22.32 | 23.85 | 36.79 | 32.39 | 32.01 | 30.32 | 40.66 | .... |
| Nov. | 22.13 | 24.71 | 31.50 | 34.50 | 32.15 | 30.52 | 43.11 | .... |
| Dec. | 22.28 | 25.21 | 33.03 | 36.74 | 32.90 | 31.08 | 43.37 | .... |
| Average for Year | 21.89 | 23.25 | 31.28 | 35.11 | 34.64 | 32.44 | 37.05 | .... |

Note: The Government established a ceiling price of 45.76c for spot cotton on March 3, 1951. (a) Trading suspended during February.

## Consumption of Vinyl Resins

*(In Thousands of Pounds)*

| | Sheeting and Film [a] | Textile and Paper Coating Resins [b] | Molding and Extrusion Materials [b] | All Other [b, c] |
|---|---|---|---|---|
| 1946 | 52,080 | 11,673 | 61,852 | 27,082 |
| 1947 | 66,430 | 17,237 | 73,114 | 27,064 |
| **1948** | **98,021** | **31,085** | **73,598** | **21,147** |
| 1949 | 157,544 | 29,470 | 81,842 | 19,792 |
| 1950 | 227,149 | 46,044 | 113,889 | 21,868 |
| 1950: | | | | |
| Nov. | 16,683 | 4,215 | 9,981 | 1,897 |
| Dec. | 19,338 | 4,377 | 10,926 | 1,537 |
| 1951: | | | | |
| Jan. | 15,552 | 3,788 | 11,133 | 1,263 |
| Feb. | 12,978 | 3,260 | 9,916 | 1,247 |

Source: Bureau of the Census.

Notes: (a) Includes weight of fillers, plasticizers, extenders and safety glass sheeting; (b) Resin content; (c) Includes Adhesives, but excludes data for protective coating resins.

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# Rubber Industry Employment, Wages and Hours

## All Rubber Products

| | 1950 | | | | 1951 | | | |
|---|---|---|---|---|---|---|---|---|
| Mo. | Production Workers (thousands) | Average Weekly Earnings | Average Weekly Hours | Average Hourly Earnings | Production Workers (thousands) | Average Weekly Earnings | Average Weekly Hours | Average Hourly Earnings |
| Jan. | 187 | $60.52 | 39.4 | $1.536 | 223 | 67.07 | 40.6 | 1.652 |
| Feb. | 188 | 59.90 | 39.2 | 1.528 | 222 | .... | .... | .... |
| Mar. | 189 | 59.70 | 39.3 | 1.519 | ... | .... | ... | .... |
| Apr. | 191 | 61.76 | 40.0 | 1.544 | ... | .... | ... | .... |
| May | 194 | 64.52 | 41.2 | 1.566 | ... | .... | ... | .... |
| June | 199 | 65.08 | 41.4 | 1.572 | ... | .... | ... | .... |
| July | 200 | 65.59 | 41.2 | 1.592 | ... | .... | ... | .... |
| Aug. | 208 | 66.25 | 41.8 | 1.585 | ... | .... | ... | .... |
| Sept. | 215 | 66.58 | 41.9 | 1.589 | ... | .... | ... | .... |
| Oct. | 219 | 66.29 | 41.9 | 1.582 | ... | .... | ... | .... |
| Nov. | 222 | 66.52 | 41.5 | 1.603 | ... | .... | ... | .... |
| Dec. | 223 | 68.81 | 41.6 | 1.654 | ... | .... | ... | .... |

## Tires and Tubes

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Jan. | 82.6 | 67.70 | 38.4 | 1.763 | 92.1 | 74.38 | 38.6 | 1.927 |
| Feb. | 83.1 | 67.22 | 38.3 | 1.755 | ... | .... | .... | .... |
| Mar. | 83.4 | 65.26 | 37.4 | 1.745 | ... | .... | .... | .... |
| Apr. | 84.0 | 69.23 | 39.0 | 1.775 | ... | .... | .... | .... |
| May | 85.9 | 74.60 | 41.1 | 1.815 | ... | .... | .... | .... |
| June | 88.0 | 74.05 | 40.6 | 1.824 | ... | .... | .... | .... |
| July | 88.3 | 75.22 | 40.4 | 1.862 | ... | .... | .... | .... |
| Aug. | 89.6 | 76.01 | 40.8 | 1.863 | ... | .... | .... | .... |
| Sept. | 91.7 | 75.46 | 40.9 | 1.845 | ... | .... | .... | .... |
| Oct. | 92.0 | 73.12 | 40.2 | 1.819 | ... | .... | .... | .... |
| Nov. | 93.4 | 73.70 | 40.1 | 1.838 | ... | .... | .... | .... |
| Dec. | 93.0 | 76.63 | 40.1 | 1.911 | ... | .... | .... | .... |

## Rubber Footwear

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Jan. | 20.1 | 45.87 | 35.7 | 1.285 | 24.9 | 57.67 | 41.7 | 1.383 |
| Feb. | 18.8 | 43.06 | 34.2 | 1.259 | ... | .... | .... | .... |
| Mar. | 19.4 | 51.04 | 40.0 | 1.276 | ... | .... | .... | .... |
| Apr. | 19.3 | 50.36 | 39.5 | 1.275 | ... | .... | .... | .... |
| May | 19.1 | 50.20 | 39.4 | 1.274 | ... | .... | .... | .... |
| June | 19.3 | 52.07 | 40.3 | 1.292 | ... | .... | .... | .... |
| July | 19.2 | 52.13 | 39.7 | 1.313 | ... | .... | .... | .... |
| Aug. | 20.7 | 53.93 | 41.9 | 1.287 | ... | .... | .... | .... |
| Sept. | 21.8 | 53.95 | 41.5 | 1.300 | ... | .... | .... | .... |
| Oct. | 22.8 | 56.00 | 42.2 | 1.327 | ... | .... | .... | .... |
| Nov. | 23.2 | 54.52 | 42.0 | 1.298 | ... | .... | .... | .... |
| Dec. | 23.9 | 59.34 | 42.6 | 1.393 | ... | .... | .... | .... |

## All Other Rubber Products

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Jan. | 84.5 | 57.04 | 41.3 | 1.381 | 106.1 | 62.83 | 42.0 | 1.496 |
| Feb. | 86.3 | 56.43 | 41.1 | 1.373 | ... | .... | .... | .... |
| Mar. | 86.2 | 56.16 | 40.9 | 1.373 | ... | .... | .... | .... |
| Apr. | 87.2 | 57.13 | 41.1 | 1.390 | ... | .... | .... | .... |
| May | 88.8 | 57.92 | 41.7 | 1.389 | ... | .... | .... | .... |
| June | 92.0 | 59.23 | 42.4 | 1.397 | ... | .... | .... | .... |
| July | 92.8 | 59.08 | 42.2 | 1.400 | ... | .... | .... | .... |
| Aug. | 98.0 | 60.13 | 42.8 | 1.405 | ... | .... | .... | .... |
| Sept. | 101.0 | 61.30 | 42.9 | 1.429 | ... | .... | .... | .... |
| Oct. | 104.1 | 62.48 | 43.3 | 1.443 | ... | .... | .... | .... |
| Nov. | 105.0 | 62.71 | 42.6 | 1.472 | ... | .... | .... | .... |
| Dec. | 105.6 | 64.20 | 42.8 | 1.500 | ... | .... | .... | .... |

Source: U. S. Department of Commerce and Labor.

Note: Data are based upon reports from cooperating establishments covering both full and part-time employees who worked during or received pay for the pay period ending nearest the 15th of the month. The employment series have been adjusted to levels indicated by Federal Security Agency data for 1947, and have been carried forward from 1947 bench-mark levels, thereby providing consistent series. Hours and earning data pertain only to production and related workers.

# Production Index for the Rubber Industry

## Production 1935-1939 = 100

## (Based on man-hours)

| | 1949 | 1950 | 1951 | | 1949 | 1950 | 1951 |
|---|---|---|---|---|---|---|---|
| Jan. | 193 | 194 | 246 | July | 175 | 222 | .... |
| Feb. | 188 | 195 | 237 | Aug. | 178 | 236 | .... |
| Mar. | 182 | 197 | .... | Sept. | 174 | 244 | .... |
| Apr. | 177 | 203 | .... | Oct. | 192 | 250 | .... |
| May | 178 | 213 | .... | Nov. | 187 | 250 | .... |
| June | 178 | 221 | .... | Dec. | 193 | 252 | .... |

Source: U. S. Department of Commerce.

# Sales by the Rubber Industry

## (In Millions of Dollars)

| | 1949 | 1950 | 1951 | | 1949 | 1950 | 1951 |
|---|---|---|---|---|---|---|---|
| Jan. | 260 | 265 | 465 | July | 271 | 454 | .... |
| Feb. | 251 | 273 | .... | Aug. | 288 | 457 | .... |
| Mar. | 260 | 293 | .... | Sept. | 272 | 404 | .... |
| Apr. | 257 | 288 | .... | Oct. | 255 | 405 | .... |
| May | 248 | 321 | .... | Nov. | 247 | 397 | .... |
| June | 266 | 350 | .... | Dec. | 245 | 424 | .... |

Source: U. S. Department of Commerce.

# Rubber Manufacturers' Inventories

## (Based upon Book-Value)

## (In Millions of Dollars)

| | 1949 | 1950 | 1951 | | 1949 | 1950 | 1951 |
|---|---|---|---|---|---|---|---|
| Jan. | 661 | 524 | 564 | July | 625 | 501 | .... |
| Feb. | 661 | 526 | .... | Aug. | 563 | 483 | .... |
| Mar. | 653 | 532 | .... | Sept. | 538 | 502 | .... |
| Apr. | 648 | 536 | .... | Oct. | 517 | 524 | .... |
| May | 650 | 540 | .... | Nov. | 526 | 564 | .... |
| June | 644 | 544 | .... | Dec. | 531 | 549 | .... |

Source: U. S. Department of Commerce.

# Various Compounding Materials Consumed by the Rubber Industry

| Material | 1943 | 1944 | 1945 | 1946 | 1947 | 1948 | 1949 |
|---|---|---|---|---|---|---|---|
| Antimony, Primary: | | | | | | | |
| Short tons | ..... | ..... | ..... | ..... | 39 | 41 | 55 |
| % of total | ..... | ..... | ..... | ..... | .002 | .003 | .005 |
| Asphalt [a] | | | | | | | |
| Short tons | 16,510 | 20,189 | 19,483 | 28,715 | 32,113 | 19,967 | 18,050 |
| % of total | .005 | .006 | .005 | .007 | .007 | .004 | .003 |
| Barite (Barytes): | | | | | | | |
| Short tons | 8,000 | 10,000 | 10,000 | 20,000 | 17,000 | 18,000 | 14,000 |
| % of total | 3.9 | 2.9 | 2.1 | 4.4 | 3.1 | 2.85 | 2.53 |
| Carbon Black: | | | | | | | |
| Short tons | 236,737 | 369,015 | 402,193 | 470,732 | 471,790 | 435,282 | 383,565 |
| % of total | 90.3 | 94.6 | 95.5 | 95.3 | 94.3 | 95.5 | 93.3 |
| Clay, Kaolin: | | | | | | | |
| Short tons | 50,964 | 59,588 | 109,936 | 162,393 | 166,201 | 176,965 | 197,341 |
| % of total | 5.5 | 6.8 | 11.7 | 12.3 | 11.5 | 11.3 | 13.1 |
| Clay, Fire & Stoneware: | | | | | | | |
| Short tons | 10,259 | 7,160 | 7,800 | 12,951 | 17,970 | 15,480 | ..... |
| % of total | 0.2 | 0.1 | 0.1 | 0.2 | 0.2 | 0.2 | ... |
| Lime: | | | | | | | |
| Short tons | 2,039 | 5,634 | 7,170 | 3,193 | 589 | 1,154 | 715 |
| % of total | 0.03 | 0.09 | 0.12 | 0.05 | 0.01 | 0.02 | .0002 |
| Litharge. | | | | | | | |
| Short tons | 4,302 | 3,023 | 1,864 | 2,131 | 2,205 | 2,835 | ..... |
| % of total | 3.8 | 2.2 | 1.3 | 1.6 | 1.3 | 1.8 | ... |
| Lithopone: | | | | | | | |
| Short tons | 1,078 | 726 | 977 | 1,607 | 3,085 | 4,192 | 3,245 |
| % of total | 0.8 | 0.5 | 0.7 | 1.1 | 1.9 | 3.0 | 4.1 |
| Mica, Ground: | | | | | | | |
| Short tons | 3,063 | 1,137 | 3,715 | 4,951 | 3,900 | 4,372 | 3,856 |
| % of total | 6.0 | 2.2 | 7.1 | 8.0 | 6.0 | 7.0 | 7.0 |
| Sulfur: | | | | | | | |
| Short tons | 51,000 | 63,000 | 64,960 | 72,800 | 72,800 | 70,560 | 59,360 |
| % of total | 1.8 | 1.9 | 2.0 | 2.2 | 1.8 | 1.7 | 1.5 |
| Talc [b] | | | | | | | |
| Short tons | 48,994 | 51,833 | 63,758* | 65,980 | 71,840 | 66,226 | 53,414 |
| % of total | 11.8 | 13.0 | 16.0 | 14.4 | 13.9 | 13.0 | .12 |
| Zinc Oxide: | | | | | | | |
| Short tons | 67,898 | 59,518 | 63,447 | 83,776 | 82,248 | 82,895 | ..... |
| % of total | 47.4 | 42.3 | 49.6 | 53.1 | 51.2 | 54.9 | ..... |

Source: U. S. Bureau of Mines.

Notes: [a] Solid and semi-solid products of less than 200 penetration. [b] Includes prophyllite and ground soapstone. * Revised.

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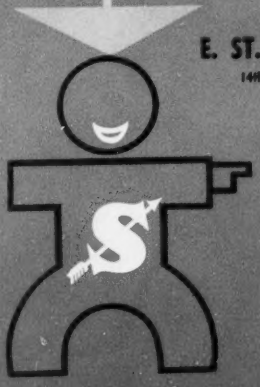

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